The Electrical Review

VOL. CXVI. MAY 17, 1935. No. 2999.

THE OLDEST ELECTRICAL PAPER. ESTABLISHED 1872.

Published every FRIDAY, Price 6d.

THE ELECTRICAL REVIEW, DORSET HOUSE, STAMFORD STREET, LONDON, S.E.1.

Telegraphic Address: "AGEEKAY, WATLOO, LONDON." Code, A B C. Telephone No.: Hop 3333 (50 lines).

The "Electrical Review" is the recognised medium of the Electrical Trades and has by far the largest Circulation of any Electrical Industrial Paper in Great Britain.

SUBSCRIPTION RATES, Postage Free: United Kingdom, £1 14s. 8d. Canada, £1 12s. 6d. Colonial and Foreign, £2 1s. 6d. per annum. Cheques and Postal Orders (on Chief Office, London) to be made payable to ELECTRICAL REVIEW, LTD., and crossed "Lloyds Bank."

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The Fair and the Convention

DURING the next few weeks the minds of most electrical men will be concentrated upon two much-discussed events—the Fair at Birmingham and the Convention at Bournemouth, in connection with both of which we are making departures from what has been regular practice for many years.

The date of the Fair, it will be remembered, has been changed because May is thought to be a more suitable time for the electrical and some other trades. The great hope of those who advocated the change is that more overseas visitors will be attracted; this year should be an ideal one for putting this to the test, as many colonial and other overseas folk who came for the Jubilee celebrations are still here.

It may be unfortunate that the change has taken place in the year of our first National Electrical Convention. Perhaps it would have been better if the events had been combined, instead of one coming on the heels of the other.

Difference of view as to date among different trades or different exhibitors in the same trade has not prevented the Castle Bromwich display from making rapid progress, but those who felt that February was wrong will now have an opportunity of seeing whether May will be more attractive from the purchasers' point of view and that, after all, is what really matters.

If the anticipation be realised, continued expansion is certain, especially if industrial revival continues. Any argument or opinion may fall to the ground in the presence of the actual result when soberly judged according to the evidence at the close of the show.

Whatever its original purpose the British Industries Fair has always made a strong Home appeal supporting the opinion that a frequent electrical market or exhibition is needed. A recognition of this fact is found in the series of organised visits of representatives of home professional and trading associations who wish to see the latest electrical products brought together at one place. It is to be hoped that the nearness of the Bournemouth Convention will not cause the visits of the next fortnight to be less well attended than those of previous years.

An effort has lately been made to link up the two events as far as possible, and, as a result, Mr. Hoadley, the president at Bournemouth, will be the principal speaker at Castle Bromwich on Tuesday next.

In certain responsible quarters the view is held that the result of the holding of the Fair in May this year will have an important bearing upon the arrangements not only for Birmingham in the future, but also for the London Section. Upon the success or otherwise of the National Convention also much depends with regard to the future.

It cannot be said that everybody is pleased with the Convention arrangements or concerning the change of date of the Birmingham Fair. We are more or less feeling our way and some are making comments as they go. It is necessary, however, that both events should be given a fair tryout, and before another month has passed it may be possible to gain an idea of the general trend of opinion.

There are several possibilities before us. One is that the Convention and the Fair should somehow be made a simultaneous and joint effort; another, that there should be the return, which some desire, to separate meetings, or sectional meetings, the Fair being held quite apart in matter of date from the meetings of the different organisations; and a third, and one worthy of careful consideration, that whatever happens in respect of the Fair there should be one National Electrical Convention every year run by all electrical associations under the control of a committee of the whole industry with a head which it shall yearly appoint, and with a combined secretariat and management, instead of it being so substantially an I.M.E.A. affair.

It is useless pretending that there is no problem; plain speaking is best. If we are going to plan for an annual National Convention of the entire industry with suitable sectional proceedings let us have a joint body set up for that purpose and let us place at its command the benefit of the best expert electrical experience and organising ability, inspired by enterprise and originality.

The Woman's View

THE announcement at the E.A.W. Conference that the Association has decided to build an all-electric house reflects the increasing interest taken by the women of this country in the modern aplications of electricity. When all is said and done and whatever we men think about it, there is no getting away from the fact that those most vitally concerned with the employment of eletrical apparatus in the home are the womenfolk. Apart from the fact that they spend far more of their time in the house than men, it is they who have to use the vacuum-cleaners, the irons, the cookers, and most of the other labour-saving devices. It is not then surprising that they should have their own ideas concerning electrical appliances and their installation, and we look forward with great interest to the completion of the first E.A.W. house at Bristol towards the end of the summer. As Miss Haslett impressed on us at the conference, the E.A.W. "being a women's association is essentially a practical one," and with its last year's resolution regarding the provision of electricity for everyone, we can rest assured that such innovations as are made will be in reach of even the poorest class of consumer.

Hydro-Electrics and Drought

THE uninitiated have a way of counting it amongst the signs of our being a retrograde people that we do not avail ourselves of the water supplies that on their holidays they think they see running to waste. The electrical man, of course, knows the reasons for his preference for other methods. Some of the difficulties attending hydro-electric plants were related in the speech of Mr. C. E. Benson at the meeting of the British Power and Light Corporation last Friday. The drought of 1933 and of the first half of 1934 seriously affected the earnings of the North Wales Power Co. The trouble was reduced in the latter half of last year when water storage began to pick up. This year, happily, the prospect is more encouraging. Up to date there is a sufficiency of water, the storage being equivalent to over 15 million units as compared with $8\frac{3}{4}$ millions at this time last year. It has been found desirable, however, to put aside a contingency reserve of £25,000 against "non-rainy days"; steady progress is expected unless there is "some more terrible drought" than has yet been experienced.

An Advertising Campaign

WE welcome an announcement appearing in the current issue of the "E.D.A. Bulletin," to the effect that the Council of the British Electrical Development Association has authorised expenditure upon "the biggest Press advertising campaign ever undertaken by the Association." This will form part of the general 1935-36 campaign of the organisation. Particulars will shortly be circulated to members. While we still respectfully hold that there should have been an electrical advertising campaign as part of the Convention publicity scheme we hope that, by the early autumn at least, the now-promised activity will begin to make a very definite impression.

The Institution

THE total membership of the Institution of Electrical Engineers rose during the past year by 531, the greatest increase for ten years with the exception of 1930. The net addition of eighteen to the ranks of full members represented only 3.4 per cent. of this figure, far less than enough to maintain even the present proportion of about one-eighth of the aggregate of all grades. In any case, 1,988 full members in a corporate body of 16,150 cannot be regarded as truly indicative of the number of electrical engineers over thirty years of age who have had five years in positions of superior responsibility. The reasons for the sluggishness of associate members in applying for transfer to the senior grade as soon as their qualifications justify it should be investigated. The annual report of the Council refers to a possible revision of the by-laws with the object of disqualifying nominees for election on whose behalf a canvass has been organised. Much would depend upon the terms in which any such revision were cast. The claims of some unofficial candidates may have been circulated in a reprehensible manner in the past, but caution should be exercised to avoid introducing too much rigidity into the procedure or creating an impression that the Council entirely discountenances outside nominations. These do show, at any rate, that the main body of members takes a serious interest in the affairs of the Institution.

Rural Plans in America

PRESIDENT Roosevelt is creating a rural electrification division as one of the three new agencies to aid the regular Government departments in the administration of the four-billion-dollar works-relief fund. Though the actual details were not disclosed to the Press at their interview with the President last month, it appears from the *Electrical World* that the Federal authorities hope to add 83,000 miles to the rural network of distribution and transmission lines. Data has so far been collected of 30,000 miles of line which the power companies regard as having the greatest immediate potentialities. The trained staff of existing utilities can readily build lines at an average cost of $1,000 per mile; under other conditions the cost may range up to double that figure and even more. Three methods of procedure under the scheme are mentioned by our contemporary:—(1) By loans to the privately-owned utility serving the region; (2) by a state agency using Federal funds; and (3) by loans to district organisations of power users. The lines will be built under Government supervision, and when it becomes possible, the interests concerned can acquire the lines and the Government investment will cease. An intensive study is being made of how electricity can be used to increase income on the farm and in rural communities, and surveys which are taking place suggest that the number of users will increase if ways are found of reducing the cost of wiring and appliances.

Neutral-Wire Switching

IT was stated at the inquest into the death of a child, caused primarily by the incorrect connection of a switch, that the accident would not have occurred had the wiring been installed after the passing of the 1934 Regulations. Section 27 (a) of the Commissioners' Regulations, which came into force on January 15th last year, states that an undertaking need not give a supply to an installation that is not constructed, installed and protected so as to prevent danger. The company giving the supply was not responsible for the installation, but evidently the public looks to supply authorities to treat the permission as an injunction by enforcing the standard of work provided for in Nos. 207 and 209 of the I.E.E. Wiring Regulations. The first prohibits the use of a single-pole non-linked switch in the neutral, and a note to the second recommends that where the socket-outlet may be misused by children, it shall be of a type in which the contact tubes cannot remain alive after, or, alternatively, are automatically screened by the withdrawal of the plug.

Poet and Peasant

IN a letter to *The Times* last week, Mr. John Masefield, the Poet Laureate, made a protest against a proposal to erect an overhead line to the village of Barnsley, Gloucestershire. He maintans that the line would mar the village, which possesses unusual quiet beauty and charm. He says that the scheme for bringing electricity to the village deserves support; "villages should have electricity wherever it is possible to bring it." We appreciate the air of sweet reasonableness which pervades Mr. Masefield's letter. It is so unlike most of the protests which we read (often inspired by "interested" parties) that we hope means will be found to meet his desire that the lines should be placed underground as in the recent case of Clovelly.

During the past few years the electrical section of the British Industries Fair at Birmingham has grown rapidly, and to-day it is truly representative of the many branches of the industry. The credit for this expansion is largely due to the Electrical Advisory Committee to which the principal associations of the industry appoint representatives. The present members of the Committee are Mr. T. R. Martin, chairman and hon. secretary; Mr. A. Albrecht, director and secretary of the Electrical Wholesalers' Federation; Mr. E. G Batt, chairman of the Heating and Cooking Section of B.E.A.M.A.; Mr. H. H. Berry; Mr. A. C. Cramb, director of E.D.A.; Major R. E. Douglas, president of the E.C.A. of Scotland; Messrs. D. N. Dunlop and V. W. Watlington, joint directors of B.E.A.M.A.; Mr. H. J. Fisher, president of the Association of Mining Electrical Engineers; Mr. E. J. Jennings, secretary and commercial manager, Birmingham Electric Supply Department; Mr. E. E. Hoadley, president, I.M.E.A.; Lt.-Col. W. J. Kent, Porcelain Manufacturers' Association; Mr. H. Marryat, president of the Electrical Contractors' Association; Dr. A. H. Railing; Mr. C. W. Sully, director of E.L.M.A.; and Prof. W. M. Thornton, president, I.E.E. The following notes give a brief forecast of the display which is open from Monday next until May 31st.

Aidas Electric, Ltd.

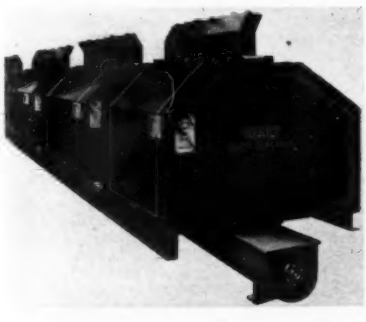
This comprehensive range of standard "Sadia" domestic water heaters includes the latest 1.5-gal. model, which is being shown for the first time. It is of the free-outlet type and incorporates devices to prevent dripping, scaling and waste, and to ensure safe operation.

W. & T. Avery, Ltd.

One of the main items inviting attention comprises two automatic grain mixing scales (illus.), which are electrically controlled and synchronised so that they can discharge together. Any number of these machines may be incorporated in the circuit, and they are usually supplied in batteries for the exact weighing of ingredients for the making of a perfect mixture.

A bulk milk weigher, a counting machine, an Avery-Goodbrand textile conditioning scale and oven, and a representative selection of visible weighers for the retail trades are also on view, together with an exceptionally fine range of modern self-indicating testing machines.

Avery-Hardoll, Ltd., an associated company, shows its latest type of electric



Avery auto-electric grain mixing scales

petrol meter pump, and "Tan-Sad" seating will be in use on the stand.

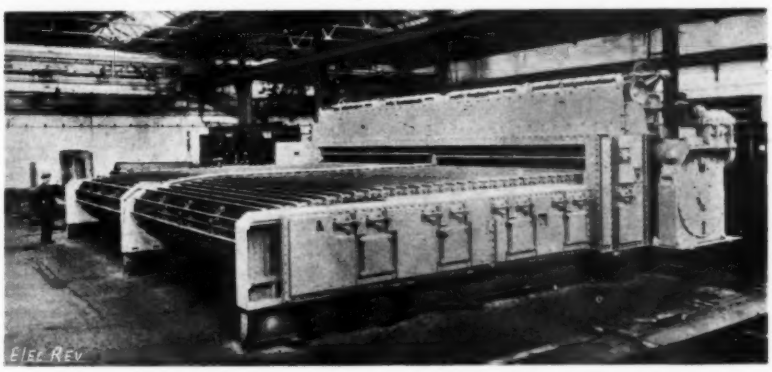
Bakelite, Ltd.

This exhibit will include bakelite synthetic resin products, moulding materials, varnishes, lacquers, cements, spirit and oil soluble resins, laminated sheet, rod and tube and silent gear material.

Babcock & Wilcox, Ltd.

What is claimed to be the largest stoker in the world (illus.) is shown complete, being one of eight "Style-28" twin stokers, 33 ft. wide and 20 ft. long, that are being supplied to the Klip generating station of the Electricity Supply Commission of the Union of South Africa, which is operated by the Victoria Falls and Transvaal Power Co., Ltd.

Fusion welding is represented by X-ray films and test specimens; a full-size



The B. & W. "Style 28" stoker

working gravity bucket conveyor includes an automatic lubricator; and a full-size small economiser illustrates flash-welded construction.

Among tube cleaners the latest is driven by a motor of from 0.75 to 3 h.p. according to duty, being semi-enclosed with ball bearings and fan cooled. A push-button starter with overload and no-volt releases is mounted beside the motor on a cast-iron truck base with steel wheels and a device for slinging. In addition a remote control push-button switch with four-core cable can be provided. The flexible driving shaft has interlocked joints into which asbestos cord is run to prevent oil leakage into the tubes, the steel outer casing having a steel helical liner. Centring screws and nuts prevent the cleaning (cutting) tools from lying on the bottom of the tube.

Other items are slide valves, oil burners, and examples of the "Calorizing" process, whereby aluminium is driven into the surface of another metal, usually mild steel, to form a ferro-aluminium alloy on the surface. This alloy is immune to oxidation up to a maximum temperature of 1,750 deg. F., and completely resists the attack of sulphurous acids. "Calmet" is a chromium-nickel-aluminium alloy steel available in cast form, specially developed for sustaining load at high temperatures. It possesses extreme stiffness at all temperatures up to a safe working limit of 1,050 deg. C., and is entirely resistant to corrosion in contact with ordinary products of combustion.

A small Clarkson thimble tube silencer-boiler, designed for Diesel and Diesel-electric locomotives, is shown, and also a portion of the inner shell of a marine exhaust gas and oil-fired boiler, showing the electrically welded vertical seam, which is in compression.

Baldwins, Ltd.

Sheets and made-up articles illustrate the numerous uses of steel, including electrical steel sheets for all grades of dynamo and transformer work. Among electrical stampings there are complete assemblies, finished laminations ready for assembly in stators and rotors, and various transformer types, as well as segmental stampings.

Batteries, Ltd.

A complete installation of miners' lamps comprises high candle-power hand and cap lamps (illus.), incorporating the "Nife" nickel cadmium alkaline accumulator. Both these types have been designed to comply with the new Mine Lighting Regulations. The handlamp is of the two-piece type, the battery itself forming the lower part, on to which is screwed a drop forging which carries the well glass, &c. Both the cap and the hand lamp batteries are fitted with mushroom-shaped solid terminals which enable them to be charged in a hanging position, and thus eliminate any possibility of corrosion while on the charging rack. The batteries are also fitted with electrolyte level indicators which greatly facilitate the procedure of topping up with distilled water.

In addition, complete equipment for charging and maintenance will include the "Nife" charging rack, which is proof against current leakage and consequent corrosion. The makers claim that the maintenance of such racks is negligible

compared with racks employing porcelain trays, contact fingers, and similar rapidly wearing parts. The ease with which the "Nife" opening magnet and the semi-automatic topping-up apparatus can be worked will also be demonstrated. Official's lamps and lamps for boys and haulage men are shown besides a range of nickel cadmium alkaline accumulators for various other applications.

Beatty Bros., Ltd.

This exhibit, as usual, will comprise examples of the company's domestic washing, wringing and ironing equipment.

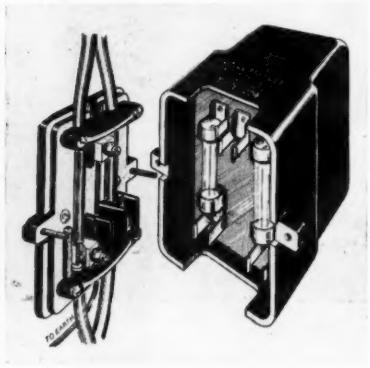
Beetle Products Co., Ltd.

In this display of aminoplastic powders, together with examples of mouldings made therefrom, are "Beetle" industrial powders in a large range of colours, including white, translucent, and pastel shades. "Pollopas" powders are offered in a somewhat similar range, and "Scarab" is one of the latest urea powders introduced to compete in price with the phenolic kind. It is made in black, brown, and bright opaque colours, claimed to be light-fast, and this material does not tend to track electrically.

Belling & Lee, Ltd.

In this display of radio interference suppressors are condenser types and models for fitting to small unearthed motors, neon and flashing signs, and lifts. There is a d.c. hum suppressor, choke and condenser units for from 2 to 30 A, and single chokes for from 0.5 to 300 A; also kits of parts for car radio instrument use.

The line suppressor (illus.) for fitting on a house service meter board, or in parallel with any pair of mains suspected of causing interference, is in a bakelite case with removable fuses, and does not necessitate cutting the conductor when fitting. There is a model for insertion in the flexible lead of unearthed domestic appliances, and another for use with machines containing a commutator motor



Line suppressor for fitting to the house service meter board (Belling-Lee)

is connected to a three-pin plug. The radio receiver power plug filter is complete with fuses, while the "Rejectostat" as made by Kolster-Brandes, Ltd., enables several receivers to make use of the same high outside aerial.

Benham & Sons, Ltd.

These cooking, heating, and ventilating engineers are exhibiting little electrical equipment. "Electrovex" radiators (illus.) are self-contained and waterless, although in external appearance they are somewhat similar to the circulation type.

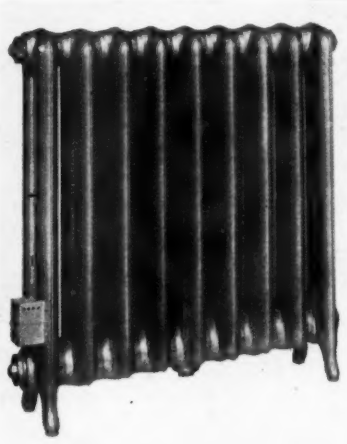
B.E.N. Patents, Ltd.

This display is in two sections, one consisting of air compressors and paint spraying equipments of the fixed and mobile, wheeled-truck patterns, both motor and engine driven. The "Handy-Spray" outfit has a 0.25-h.p. d.c. or a.c. motor supplied in interchangeable frame sizes, but a universal machine can be fitted if desired.

The other section comprises garage equipment, such as motor driven high-pressure car-washing plant, mobile tyre inflators, and portable polishers, grinders, drills, and similar tools motor driven through flexible shafting.

Berkeley & Young, Ltd.

The No. 6 "Silver Jubilee" cooker is an addition to the "Nippy" range and is suitable for the requirements of four persons. There is a standard table model and a "de luxe" model with a hot cupboard below, resting on a tubular stand. The body is of heavy gauge sheet enamelled on both sides. Vitreous enamel is used for the "de luxe" model and also for the underside of the griller-boiler to prevent scaling. The door is



An "Electrovex" waterless radiator (Benham & Sons)

hinged at the side and fitted with a thermometer, the oven having non-tip racks. The "de luxe" model is supplied complete with a splash plate, a separate switch-plug for a kettle, and a new plate basket fitted to the side of the cooker.

A 3-pint kettle of new design has an extra wide lid to enable the inside to be cleaned easily. The patented ribbon element is somewhat on the lines of a cooker hot plate, being clamped to the underside of the aluminium alloy base. This arrangement is intended to avoid buckling and to lengthen the life of the kettle. An automatic cut-out operates when the kettle boils dry, and is reset merely by pressing a button.

A coffee percolator with an element similar to that of the kettle is being introduced, while another new appliance is an egg steamer which needs only 1½ teaspoonfuls of water, and automatically switches itself off when the eggs are cooked.

To the range of fans has been added a new all-bakelite "Baby" model for suspension from a ceiling or for desk use. The motor has 8-in. blades. Another introduction is a 6-in. light-type exhaust fan driven by a totally-enclosed ball-bearing motor.

Berry's Electric, Ltd.

An important item on this stand is one of the actual fireplaces which are to be installed in the "King's House" which is to be built as a Jubilee gift from the Royal Warrant Holders Association. The surround is constructed of Hapton wood and Derbyshire fossil marble, and has an electric heater of 3-kW capacity, with two semi-elliptical screens which may be illuminated to produce winter and

Berry fireplace suite of the type that is to be installed in the "King's House"

summer effects as desired. In addition, the fire incorporates apparatus for air conditioning in summer.

Better Lines Co.

The outdoor pole-mounted unit type "Safety First" sub-stations exhibited are provided with a single control mechanism for both h.v. and l.v. circuits, the transformer being of 5-kVA single-phase to 100 kVA three-phase, with a standard tank cover to facilitate change of capacity. An example is illustrated on page 698.

All porcelain is in compression, and there are no slamming actions which might break the insulators. The weight of the transformer is taken off the wire rope in the closed position and an off-load circuit-changing switch may be incorporated in the transformer. The load is switched in and off on the e.h.v. contacts and the action is spring controlled. Alternative contacts of the plug and socket type may be fitted if preferred. Changing of the oil in the tank is carried out at ground level. The worm-driven winch operates on a double purchase lift and being of the self-sustaining type retains the load in any position. The transformer may be lowered direct on to a vehicle, and the removal of four small bolts frees it from the carrier.

Birkbys, Ltd.

To the various forms and grades of synthetic resins, varnishes, and moulding powders has now been added an "Elo" lamp capping cement that is supplied in the form of a fine powder which is readily made into a paste by the addition of methylated spirit (i.e., 10 per cent. or one pint to 10 lb.). For curing this cement requires to be stoved for 3.5 minutes at 200 deg. C.

The selection of mouldings displayed includes many examples made for the electrical and allied trades, such as switch covers and plates, dollies, plug tops and bases, fuse parts, commutator brush boxes, also a variety of mouldings for the telephone and wireless trades, complete cabinets, clock cases, and variegated ware of all descriptions, besides impregnating compounds for armatures.

Birmingham Battery and Metal Co., Ltd.

Specimens of exceptionally large sizes are copper circles and condenser plates, a portion of a solid-drawn copper tube, 24 in. in diameter, and brass tubes up to 18 in. diameter. Other items are film strip for radiators, condenser tubes in brass, cupro-nickel, and aluminium-brass, refrigerator tubes with a special interior finish, light gauge copper tubes for domestic water supply, a coil of panel tubing (over 200 ft. continuous length) for heating, and copper-covered steel superheater tubes.

Birmingham Electric Furnaces, Ltd.

Of chief interest among furnaces is the "Birlec-Detroit" rocking electric arc melting equipment (illus.), which, by an agreement with the Detroit Electric Furnace Co., is now available entirely British made in the British Isles, the Dominions, and certain other countries. The arc is formed on the axis of a horizontal cylindrical chamber which is continuously rocked about its axis during melting. In this way rapid heating of the metal is obtained and also uniform distribution of all constituents throughout. Over six hundred of these equipments are already in use in brass foundries and for the production of high-test malleable and other special grades of cast iron.

A continuous belt conveyor furnace for bright annealing and similar operations employs a wire mesh belt for carrying the work consecutively through the heating and cooling chambers, filled with an artificial atmosphere which prevents oxidation of the work and allows the brazing material to flow smoothly over the metal without the use of any flux. In this way the brazing compound (usually copper or brass) penetrates to every part of the joint without the necessity of any manual operation and without setting up any strains in the materials.

Another item is a small forced-air circulation, low-temperature furnace for tempering and similar processes.

Birmingham Electric Supply Dept.

The principal feature of this stand is automatically controlled electric welding apparatus. One Igranic controlled unit is particularly adapted to machines of the spot welding type. The other contains a "Thyratron" control panel, which is especially suitable for use in conjunction with seam welders, and where stitching by electricity is of importance, as in the case of the light metal industries.

An electric monotype printing machine is a comparatively recent development, and another interesting exhibit is a 40-kW electric furnace, which embodies the latest principles governing the heat treatment of metals. Special attention is drawn to the design of the furnace arch, which is designed to give a uniform temperature over the whole of the production area.

A small portable electrically driven suds pump, with tank, is designed for simple attachment to high speed tools, to replace the old drip method of cooling the working faces and tool points.

Besides a comprehensive display of portable electric tools, equipment for cafés is shown.

Birmingham Electrical Mfg. Co., Ltd.

These makers of domestic electrical appliances display many examples of their "Pyramid" and "Birmaco" equipment.

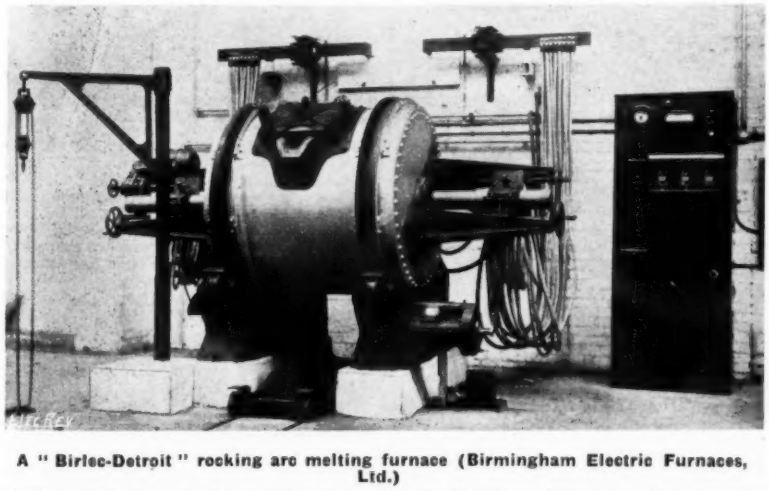
Black & Decker, Ltd.

A range of portable electric tools with a pistol grip and trigger switch includes bench grinders, valve grinding and cylinder decarbonising equipment, and an electric "vitrifier" that enables surfaces to be rubbed much more speedily than by hand polishing. By simple thumb pressure on a convenient plunger the right amount of liquid is liberated through the centre of a lambswool pad on to the surface being polished without stopping the machine. Similarly constructed sanders can also be used for wire brushing, while the rotary wood planer consists of a shaped disc in which three blades are adjustably set for deep or shallow cutting. These portable tools are driven through a right-angle spindle at high speed by a universal motor, which is available for voltages of from 32 to 250 and provided with a three-core earthing cable.

S. O. Bowker, Ltd.

A "pilot" switch is to be on view for the first time, other of the newer items being a universal round junction box, and a pressed steel box specially made for use in conjunction with oval conduit. It is applicable to house skeleton work and is screwed to the wall for plastering. The switch movement in the usual bakelite housing is snapped into the steel box. Accessories for the "Tenby" wiring system have not been radically altered.

The bell push has self-cleaning contacts and is of the same depth as the shallow switch (9/16 in.), which avoids the necessity for cutting away brickwork, and requires the removal of plaster only for flush fixing. Turret terminals facilitate wiring, and the quick-make-and-break positive action is semi rotary, being operated by a tumbler-type dolly made of metallically reinforced and turned "Erinoid." The "Tenbylux" switch and box are specially designed for use with bakelite or glass plates. When fitted on a special surface plate the switch has a semi-sunk appearance, projecting only 0.75 in.



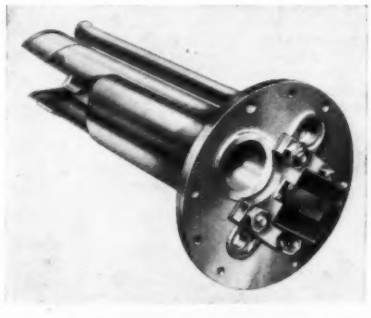
A "Birlec-Detroit" rocking arc melting furnace (Birmingham Electric Furnaces, Ltd.)

Bratt Colbran & Co.

Apart from high-grade fireplaces and electric radiators of distinctive design, including an electric screen fire, there is displayed an actual electric fireplace which the company is supplying for the "King's House" that is being erected at Burr Hill, Surrey, by the Royal Warrant Holders' Association as a Jubilee gift.

George Bray & Co., Ltd.

Immersion heaters and circulators for domestic uses include an anti-scale immersion type (illus.), which is shown for the first time; also radiators, boiling plates, range plates, and kettle elements. Heaters are made for industrial purposes up to 1,000 deg. F. of the metal-clad embedded strip and ring element types, and cartridge heaters, as well as large and small immersion heaters, metal-melting pots, glue pots, press platens, &c. There is also a selection of general insulator refractory ware, such as small and large tubes, screwed tubes, bushes, beads, firebars, furnace insulators, &c.



Anti-scale immersion heater (Geo. Bray)

Britannia Batteries, Ltd.

There is a display of stationary batteries, open and sealed, in double glass boxes to reduce risk of breakage; if a box does break the battery circuit is not interrupted. Emergency lighting batteries, with complete automatic equipment, are shown in operation.

The lead-acid vehicle battery exhibited has tubular positive plates, and the negative plates have a "rippled" surface which provides freer acid circulation. Tubular marine batteries have similar plates and they are in boxes which provide extra acid space above the plates to allow for heeling of the vessel, and extra space below the plates for sediment.

A new 6-V battery for use with the Milnes h.t. unit is to be seen, along with standard "Pertrix" starting and lighting batteries for every make of motor car. For buses and heavy commercial vehicles a tubular positive plate battery is specially designed to withstand heavy loads and vibration. There are also alkaline batteries with tubular positive plates, made in England; nickel-iron and nickel-cadmium types; and "Pertrix" non-salammoniac dry batteries.

A new semi-unspillable accumulator for radio valve filaments, shown for the first time, is fitted in a glass box. It is claimed to be leak-proof and fire-resisting, and recharging can be carried out at a fairly rapid rate.

British Electric Meters, Ltd.

Among this collection of meters are examples of prepayment types in both bakelite and drawn-steel cases. An optional coin change plate—shilling and penny—is exhibited, in addition to synchronous electric clocks.

British Electric Welding Machines, Ltd.

Two machines are shown fitted with B.T.H. thyratron control gear. One is a 15-kVA seam welder (illus.) for alloy steel sheets up to two thicknesses of 18 gauge. Although arranged for belt drive, it can be supplied with a self-contained motor. The frame is fabricated and rigid, and the transformer is provided with five speed-changing tappings. The other machine is a 22-kVA continuous spot welder for sheet steel up to two thicknesses of 18 gauge. It is capable of making 180 spot welds per minute, and will close the joint to practically a single thickness, making it liquid tight. The frame, transformer, and method of drive are similar to those of the other machine.

British Driver-Harris Co., Ltd.

The nichrome series of alloys is prominently displayed in the form of wire, rod, and strip, oxidised and bright-annealed, in sizes varying from 0.001 in. to heavy sections for industrial purposes. It is also shown in the form of castings and forgings and as "shot" for addition to cast-iron. Pure nickel and manganese nickel in the form of strip and wire, as used extensively in the radio, electric lamp and sparking plug industries, is also featured, together with a range of other nickel alloys devoted to a wide diversity of applications.

A 15-kVA seam welder with thyratron control (British Electric Welding Machines, Ltd.)

Basch and Harsch life-testing apparatus shows the method adopted in the company's laboratories for control of the nichrome alloys supplied by it, and there are also various parts and pieces of domestic and industrial apparatus made from the semi-raw materials which the company manufactures, such as electrical heating apparatus, electric lamps, wireless valves and other parts, rheostats, motor starters, sparking plugs and thermo-electrical pyrometers. Other products are v.i.r., t.r.s., motor car and lead-covered cables and lead piping.

British Electrical Development Association.

The E.D.A. information bureau is a kiosk in the centre of the electrical section of the Fair. There are also a rest lounge and four attractive dioramas illustrating industrial and domestic applications and street lighting, while two luminous graphs show the development of the electricity supply industry during the King's reign. A guide to the electrical section of the Fair has been prepared by the Association.

British Oxygen Co., Ltd.

These exhibits are grouped into oxygen cutting machines, welding and cutting equipment, and metal-spraying plant. For electric arc-welding in structural engineering "Ferro-Arc" electrodes are being tested by actual demonstrations. Types of electrodes for other purposes, including hard deposits, cast iron, and for high tensile strength and specimen welds of various types will be available for inspection.

British Sangamo Co., Ltd.

The single-phase type "H.M." meter is of the all-insulated pattern, its case and base being of moulded bakelite. Prepay-

ment meters (illus.) take one, two, or three coins in one slot and fixed charge collectors can be fitted to all large base prepayment meters. They are available to collect from ½d. to 1s. 10½d. per week in ½d. steps, 1d. to 3s. 9d. per week in 1d. steps, and 2d. to 7s. 6d. per week in 2d. steps. The collector embodies a self-starting synchronous motor, and the rate of collection can be easily varied in less than a minute without removal of the meter cover. A dial measuring arrears up to £1 is also incorporated.

The splitter block is a small terminal distribution box in a moulded bakelite case containing two terminal studs suitable for insertion into the load side of the meter. By means of this splitter block three separate circuits can be conveniently connected up to the meter, avoiding the bunching of wires. A feature of its design is that as one of the terminal studs is adjustable it can be fitted to meters of all makes. It is made in capacities of 2½ to 20 A and 25 to 50 A.

Polyphase meters are manufactured with side or bottom connections and m.d.i. attachments with a self-contained timing arrangement can be fitted to nearly all types of a.c. meters.

Type "S" time switch is a synchronous model enclosed in a weatherproof aluminium case with a separate terminal chamber. It can be supplied with a solar dial, with advanced or late time cut-outs, and also with a power reserve of nine to twelve hours which operates the switch in case of current failure.

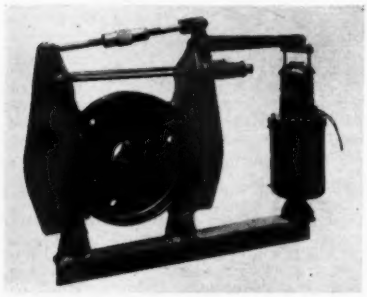
British Thomson-Houston Co., Ltd.

Through the centre of this stand a model road has been constructed and merges into two of the main aisles, forming a natural setting for the demonstration of street lighting equipment and "Mazda Mercra" lamps. There are also several types of floodlighting units specially developed for the Jubilee Celebrations, together with a range of industrial fittings for interior and exterior use.

Apart from new designs of street lighting lanterns for "Mercra" lamps the company has also developed an improved "Crown" lantern for standard gasfilled lamps. Other items are sunlamp equipment, and the "Safety First" handlamp transformer, designed to reduce voltage from the mains point to 12 V, for operating a 36-W headlamp.

In addition there are B.T.H. exhibits on the stand of the Birmingham Corporation. Thyratron control equipment for electric welding can handle up to 350 kVA and the welding current can be made and broken up to 1,500 times per minute with precision. A solder pot employing two cast-in "Torribar" metal immersion heaters, each of 2-kW input at 250 V, is used for tinning copper conductors and is carried on floor stands with wheels to enable it to be easily transported. Fully automatic temperature control is employed by means of a thermostat with the heaters in parallel.

A novel application of a fractional h.p. motor is shown in the "Nu-Este" machine, which is a simple means of cleaning and polishing plate or sheet glass windows, showcases, mirrors, marble, woodwork, tiles, and floors. This machine is made in two sizes for the patentees, Messrs. Turner (Nu-Este), Ltd., Manchester. It is a portable self-tained unit comprising a B.T.H. universal motor, which drives a worm reduction gear through a shaft running on



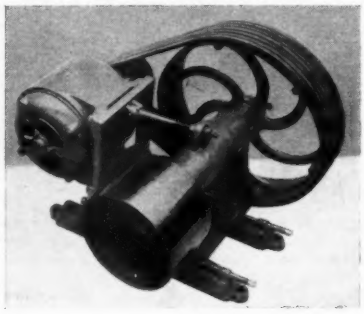
A typical example of B.T.H. "Thrustor" operated brake

ball bearings mounted in an insulated steel tube. The worm reduction gear at the top of the main shaft is fitted on each side with an extended spindle, on which are mounted felt mops, which revolve at a speed of 850 r.p.m. The switch for the motor is conveniently placed for thumb operation, and when the mops are in motion, the operator is relieved of the weight of the equipment, as it tends to climb.

The electro-hydraulic "Thrustor" (illus.) is shown operating a brake, and there is a 6-gal., 22-ft. head, 3-phase motor suds pump for supplying lubricant to the cutters of machine tools.

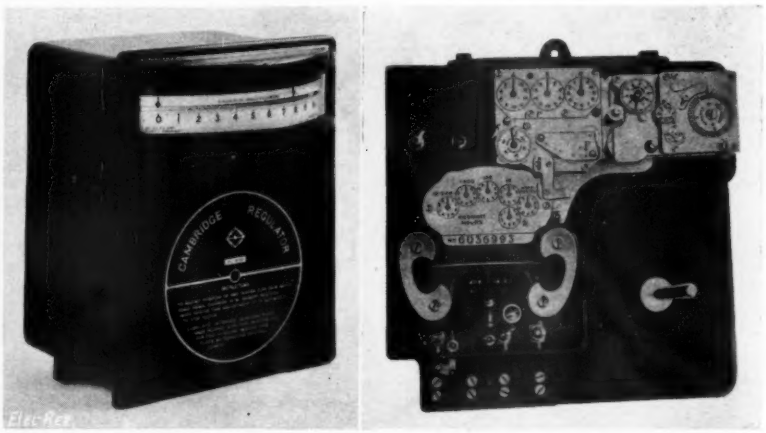
Brook Motors, Ltd.

Demonstrations include a capacitor single-phase motor starting 150 times per hour against load; a "Cylent" motor with multiple-pad sleeve bearings; and a



A Brook Motors vee-belt speed reduction unit

machine running on a spring bed to indicate the degree of balance obtainable. There is also a special motor capable of reversing thirty times per minute continuously on load and multi-speed units capable of running at 3,000, 1,500, 1,000 and 500 r.p.m. Patent vee-belt speed-



Cambridge temperature regulator (direct deflectional type) and (right) Sangamo three coin prepayment meter with fixed charge collector

reducing units (illus.) provide 4 : 1 silent reduction with 98.5 per cent. transmission efficiency, both primary and secondary drives being independently adjustable. Comparative frames of special, standard and commercial class motors, examples of starters, and a half-section of a 20-h.p. slip-ring motor are other items.

Broom & Wade, Ltd.

The high-speed stationary sleeve-valve air compressor directly coupled to an electric motor specially developed to operate at 1,000/1,200 r.p.m., is of exceptionally compact dimensions and over 1,200 have been put into service during the past 4½ years.

It incorporates a single reciprocating sleeve which carries out the duties of both inlet and delivery valves, and therefore differs radically from the common type of air compressor employing various automatic valves. At the speed provided, the cycle irregularly is kept well in hand by the comparatively small flywheel between the motor and the compressor, and as the latter requires only about 30 per cent. of the full-load torque to start it a standard modern salient pole synchronous motor can be employed and mounted on a common bedplate. The set shown on the stand has two cylinders and its actual capacity is 100 cu. ft. of free air per minute at 100 lb. per sq. in. pressure. Sets of similar design range in capacity from 80 to 555 cu. ft. p.m. working pressure for all the sizes is 100 lb. per sq. in.

Bulpitt & Sons, Ltd.

"Swan" cooking utensils, which include kettles, percolators, porringers, tea urns, steam cookers, &c., embody an immersion-type element. A comprehensive range of electric fires embraces bowl, panel, screen and inset patterns.

This company's new flat-bottom ware for use on electric hot plates is also being shown, and two other new lines are wash boilers and an electric kettle which boils three pints of water in five minutes.

Burnley Components, Ltd.

The more popular types of "Burco" clothes wash-boilers are the main exhibits. There are three grades of hiring and housing estate models, together with attractive "de luxe" boilers in a variety of finishes, as well as a low-priced builders' boiler.

Bylock Electric, Ltd.

The complete range of electric vacuum cleaners now includes the new commercial model for use in large houses, hotels, offices, &c. The Bylock floor polisher is a new line, which has been specially designed for the modern house. There is also a medium-sized hair dryer, which is well insulated and quite compact.

Cable Makers' Association.

This joint exhibit prepared by the members of the Association is representative of the various types of cables and accessories used in electric light, power and telephone installations, including cables insulated with paper for working pressures up to 132,000 V. Cables for use underground are insulated with paper, cambric or bitumen, with different styles of armouring and protection. There are rubber-insulated cables with various metallic and non-metallic protective coverings in single-core concentric and multi-core types, also special house wiring systems, both in conduit and protected surface wiring systems; flexible cables with external braiding, flexible armouring, special wire armourings and other methods of protection and certain types of flexible cords; air-spaced dry-core telephone cables for use underground; submarine telephone cables; feeder pillars, boxes, etc.

Cambridge Instrument Co., Ltd.

On a large panel of the type employed in modern power stations are a number of typical instruments, all flush-mounted. Indicators and recorders of temperature and pressure include one of the patented illuminated moving scale indicators, giving an equivalent scale length of 24 in., a six-point vertical scale pressure indicator in which the six scales are mounted side by side vertically, a 24-point indicator for an electric distance thermometer outfit covering temperatures from 30 to 800 deg. F., and an 8-point indicator for CO_2 percentage measurements with a range of 0-20 per cent. CO_2. Also a vapour pressure thermograph with a range of 50-200 deg. F., a circular thermo-electric indicator with a range of 0-800 deg. C., a pressure recorder with a 10 in. chart, and dial draught gauges of 8 and 13 in. diameter. Three new instruments are a 4-point continuous paper recorder for thermo-electric work, a potentiometric recorder, and a 2-point model "B" recorded, which enables records from two electrical CO_2 meters

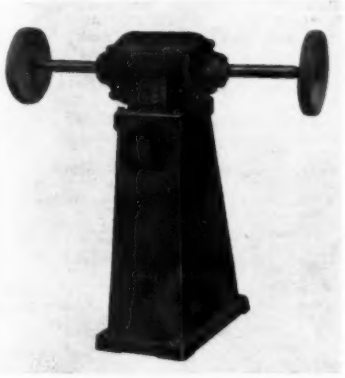
to be made simultaneously side by side on one chart without any possibility of the two records overlapping; the instrument is automatically switched over in turn from one CO_2 meter to the other, and at the same time the zero of the galvanometer pointer is set up by an electrical device so as to cause the pointer to record on the second half of the chart.

Standard indicators for electrical distance thermometers and for thermo-electric outfits are fitted with a patented magnetic cushioning device which causes the moving system to float, as it were, in the magnetic field of the galvanometer magnet, and thus the sensitive parts of the galvanometer are safeguarded from any risk of derangement due to shock or vibration. A new thermocouple for molten metal temperatures is extremely sensitive and quick in action, while a new form of shield protects the hand of the operator.

The direct deflectional regulator (illus.) has two pointers, one of which is movable and can be set to any temperature at which it may be desired to control the process or furnace. Normally both pointers will be opposite one another, but if the temperature should alter from that at which it is desired to maintain the furnace, the indicating pointer will be deflected and a mercury switch automatically operated to break (or make) the electrical controlling circuit with an accuracy of 0.1 per cent. of the full scale reading up to 30 A at 200 V without need for the introduction of external relays.

W. Canning & Co., Ltd.

This electro-plating exhibit is more comprehensive than ever, and a com-



The Canning two-bearing type polishing motor

plete small rotary chrome-plating apparatus is to be seen in operation. A warm nickel-plating vat is heated by a gas "circulator" complete with filtering and agitating coils. There are models of fully automatic plants for chrome and nickel plating, and a group of newly designed polishing motors of 1, 2 3, and 5 h.p., one fitted with a dust extractor.

Rod and tube polishing machines of various types (illus.) for metal and non-metallic materials, including two machines of the centreless type for rods and for miscellaneous articles, are represented. Electro-plating barrels with stoneware vats, the "Novat" barrel, and bench mounting non-metallic container types of plating barrels, an electrically heated sawdust barrel for drying-out, and a rubber-lined plating vat are also shown.

Low-voltage dynamos, motor generators, a low-voltage metal rectifier, and accessories for electro-plating are other items as well as a range of polishing lathes and plating and polishing materials.

Carron Company.

Electric cooking and heating appliances embody a full range covering all family requirements, while breakfast cookers also find a place. The "Carronette" and "Carronian" cookers and the breakfast cookers, particularly the B.2 type, have been generally adopted by supply authorities for hiring schemes.

Electric fires in a wide variety range from the cheap heater to period models of the coal-fire type. Of inset fires for building into or fixing against the walls of a modern home, there are several examples finished in enamel in a variety of pleasing colours. Tubular heaters and irons, nickel-plated and enamelled, are included.

Ceag, Ltd.

This is a display of miners' safety lamps for use both above and below ground, including hand and cap lamps with either lead/acid or alkaline batteries. For use underground there are such special purpose types as inspection, shaft and gate-end lamps as well as patent combined gas-detecting and inspection lamps. For use in dangerous atmospheres above ground there are certified flame-proof torches, inspection lamps and can and barrel searcher lamps.

A feature of the "Lumax" low-voltage bulb display is a selection of parts illustrating different stages of manufacture, the types made ranging from 6-mm. telephone indicating lamp bulbs to 30-V train lighting bulbs and automobile lamp bulbs.

Chloride Electrical Storage Co., Ltd.

To minimise acid spray attack on machinery or apparatus in the vicinity of a battery a special spray-arresting device is embodied in a stationary battery of the standard Planté type. The device also reduces the amount of distilled water required for topping up the cells. These "semi-enclosed" type cells are made in all sizes. Another new type is the "talkie" battery made up in six-volt units in a three-compartment glass monobloc container and fitted with an indicator to show the amount of charge left in it. The recently introduced radio battery using an "Exide Ironclad" positive plate is also shown together with batteries specially developed for vehicle propulsion and marine work.

"Chloride" batteries for stationary installations, heavy-duty flat-plate batteries for big commercial vehicles, and "Exide" and "Drydex" batteries for car and radio purposes form part of the display, while the "Keepalite" system of automatic emergency lighting is shown in operation.

Clear-Hooters, Ltd.

Electric horns, of the high-frequency magnetic type, are available with a trumpet and in the form of small discs suitable for cycles, operated by a push button which may be mounted on the car door or steering wheel, or cycle handlebar, and made for 4, 6 and 12 V.

The "Redray" cycle rear lamp is dry battery operated and provides 7 sq. in. of illuminated surface when the bulb is switched on and a white disc when not. The "Cyglow" has a projecting glass prism which enables the light to be seen sideways from cross roads as well as directly behind. The "Sonorlite" is a combination rear lamp and hooter, while the "Cycator" combines a direction indicating arrow with the word "stop" and a red rear light. The indicator is operated by a dry battery and the lamp is energised from the dynamo lighting circuit. A waterproof switch on the handlebar can be operated while applying the brake, while an intermittent tell-tale lamp illuminates the thumb piece to enable the rider to operate the correct signal switch and assures him that the back light is working correctly.

Commutator Grinding Block Co.

Stones of various patterns for grinding motor and generator commutators and slip-rings are shown by this firm.

Concordia Electric Safety Lamp Co., Ltd.

Besides high candle-power colliers' lamps of the "K" type (illus.), there are alkaline lamps dating back to 1909, and such lamp-room equipment as a charging stand and switchboard, a lamp rack and a magnet opener, together with the usual accessories and tools. Special lamps of various kinds include those which give a beam instead of an all-round light. Officials' lamps comprise samples of the approved type torch fitted with a long-life dry battery, types "O.K.1" and "O.K.2"; special purpose types "O.K.3" and "L.A.K.," cap lamp "C.K.D.," and a combined electric and flame gas testing lamp. There is also a directional photometer by means of which colliery managements can ascertain easily and with reasonable accuracy whether the lamps in use are maintaining the degree of illumination called for in the latest Mines Dept. Regulations.

Concordia Electric Wire Co., Ltd.

A special display is being made of "Herculacker" flame-retarding cables,

Two types of miners' lamps—the "Nife N10" alkaline model (Batteries, Ltd.) and the Concordia Electric Safety Lamp Co.'s "KG" type

which are of a normal type and impregnated with non-inflammable lacquer. They are supplied in a variety of colours and are said to be very suitable for switchboards and other electrical apparatus.

Enamelled and paper-insulated wires of flame-resisting varieties are also available, and there is a good selection of enamel-, cotton- and silk-covered wires; paper insulated wires, copper braids, dynamo flexibles, and bell wires; radio, telephone, and other classes of flexible cords, besides v.i.r. and t.r.s. cables.

Consolidated Pneumatic Tool Co., Ltd.

The series of "Hicycle" electrical appliances includes machines for drilling, reaming, screw driving, nut and stud fixing, grinding, sanding and polishing. These tools are all of light weight, while they are claimed to be economical in power consumption and cheap to maintain. There is also a range of universal electric tools and air-operated hammers and drills.

Crompton Parkinson, Ltd.

Standard Crompton lamps of the usual domestic range, together with high-power lamps up to 1,500 W and various special lamps are featured, besides the Kye range in four sizes (25, 40 60 and 100 W) for seven standard voltages.

Cables made by Derby Cables, Ltd., and marketed by the Lamp and Cable Department of Crompton Parkinson, Ltd., include all the important types of v.i.r. cable, and several specialities. Of these "Derite" insulated cable, braided and unbraided, and "Derite" cab tyre are the most important. "Derite" is a tough elastic and resilient compound sheathing which is homogeneous, stable and resistant to the effects of moisture, sunlight, high temperatures, acids, and alkalis.

Another product is "Derbel" bell wire which is superior to the ordinary cotton-covered paraffin waxed bell wire, especially for damp situations. It consists of high conductivity tinned copper wire insulated with vulcanised rubber. In the case of the twin wire the two cores are held together side by side, the outer covering of one being square and of the other circular so that they can be readily distinguished, even in the dark.

Crosthwaite Engineering and Furnace Co., Ltd.

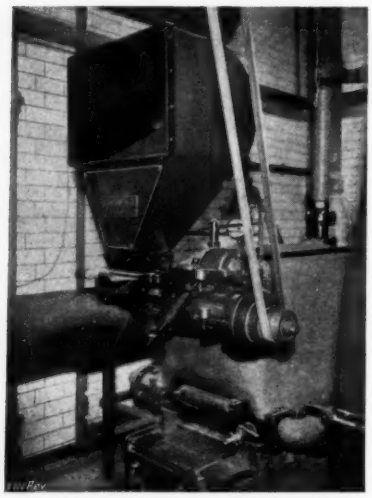
The "Junior" mechanical stoker (illus.) has been specially designed for working in conjunction with a fixed forced draught furnace for the smaller size of heating boiler, and also for fitting to small Lancashire, Cornish, and "Economic" boilers, where it is impossible to fit the standard mechanical stoker.

The stoker portion, with the motor and fan, can be moved away from the boiler front on a suitable bogie for cleaning out. The air box also comes away with the bogie, leaving the air tube ends open for the removal of any flue ash that may have accumulated.

For fitting to the larger size of heating boiler where there is sufficient room for a cleaning door underneath, the stoker is fixed permanently to the boiler front and the bogie dispensed with.

Samples of grades of fuel which can

be burned successfully on Crosthwaite grates are shown, complete with fuel analysis, and also a range of firebars. The Cochran boiler belonging to the Ex-



The "Junior" mechanical stoker (Crosthwaite Engineering & Furnace Co.)

hibition authorities will be fitted with a Crosthwaite fixed forced draught furnace for the duration of the Fair.

Scriven & Co., an associated concern, exhibits a set of three-throw hydraulic vertical pressure pumps.

Donovan Electrical Co., Ltd.

Heavy-duty ironclad switch, fuse, and motor control gear includes ironclad "Donlok" and "Safuse" switches up to 400 A capacity, and "Safuse" distribution boards up to 300 A capacity; interlocked switch sockets and plugs up to 100 A capacity; and "Solink" isolating links in the new pattern cases with hinged lids.

An entirely new design of high current capacity fuseholder is said to eliminate the possibility of deterioration with springy contacts; its essential features are screw-expanded contacts engaging in solid contact blocks. There is a range of a.c. contactors and power relays for miscellaneous applications; a.c. push-button starters of the direct-on, reversing, and resistance types up to 50 h.p. capacity; primary resistance starters of new and compact design; and hand-operated and push-button controlled resistance starters for single-phase repulsion induction motors.

A new d.c. push-button step-by-step resistance starter for small motors has simple mechanism and is of compact construction. An across-the-line starter for small d.c. motors, a range of d.c. contactors up to 150 A capacity, and a new range of push-button control stations are among a number of other devices.

Duroglass, Ltd.

This is a display of opal lighting ware including advertising globes of all descriptions, such as petrol pump globes and other commercial illuminating glassware. Table and ornamental crystal glass in modern designs as well as plain and etched glass for use in hotels and on ships is made at the associated works of Thos. Webb & Sons.

Eca Ray Sales, Ltd.

These distributors of silvered-glass reflectors are showing an indirect lighting standard which is said to be of exceptional design and power; also a full range of reflectors, together with the latest models of thin silvered-glass interior all-weather floodlights and an industrial pattern reflector suitable for 500-W lamps which will be making its first appearance at the Fair.

Electrolux, Ltd.

This company's latest refrigerator is the model LJK, of approximately 4 cu. ft. capacity. It is air-cooled and functions automatically by the application of electric heat, ten-step selective temperature control being provided. The exterior finish is washable cellulose enamelled steel, while the interior lining is porcelain enamel on steel. The interior radiator has a porcelain enamelled cover and a spring door covering the ice drawers, the adjustable shelf area being 7.5 sq. ft. The absence of moving parts eliminates noise and vibration.

The vacuum cleaner (illus.) is provided with numerous attachments, including a sprayer and air-purifying pad, while an indicator in the cylindrical container shows when the dust bag needs emptying. When empty the indicator is white with a black diagonal line across it. When the red shadow completely covers the indicator aperture the bag requires emptying.

The "Clix" universal two-way combined lamp-holder adaptor and wall plug is changed over simply by unscrewing the cover and reversing the body, leaving the wiring undisturbed. The two- and three-pin wander socket can be connected by any length of cable to a three-pin 15-A plug, so providing an extension from the fixed wall socket to any part of the room.

Moulded sockets are made with a circular groove for aligning the plug pins when inserting them. An insulating wall is provided between the pins and the centre screw, which holds the cap cover. The contact pins cannot collapse, since they do not reach their limit of elasticity even under maximum compression. They are shaped like split pins, the top eye gripping the bared end of the flex on to a fixed bridge piece, the pins being held in position by the cover. A cord grip in the form of a tortuous path relieves the flex of all strain at the contact points.

An Electrolux vacuum cleaner

The contact sockets are in the form of helical slots, held by a resilient coiled spring.

Electromagnets, Ltd.

Magnetic chucks are made for holding difficult shapes during machining and grinding operations. Magnetic clutches are supplied for rolling mill screw-down gear, for power transmission generally, and also in connection with machine tool drives, variable speed reduction gear, and for starting synchronous motors under full load.

Lifting magnets are available in various types for handling skull cracker balls, pig iron, and scrap in iron and steel works generally; also for unloading railway trucks and handling constructional materials. Besides magnetic separators of the rotary and drum types, there are magnetic chutes, vibratory and jig shaker separators, and a number of small appliances such as scrap-sorting magnets and laboratory testers.

Electrona Electrical Products, Ltd.

Vacuum cleaning equipment is shown on this stand, in addition to electric floor polishers and a portable electric sander for woodwork.

Thos. R. Ellin (Footprint Works), Ltd.

In this display of engineers' and electricians' tools are soldering irons, pliers, cutting nippers, tube cutters and vices on stands, hacksaw frames, spanners, wrenches, and similar equipment.

Enfield Rolling Mills, Ltd.

On this stand there are shown numerous examples of the non-ferrous metal products turned out by the company, including sheets, strip, rods and extruded sections.

English Electric Co., Ltd.

There are exhibited cookers and water-heaters of various sizes, and portable fires ranging from 1 to 3 kW in a large variety of finishes, including reflector types. New portable models are constructed of pressed steel and shaped on modern lines. They are exceptionally strong and have flat tops, which can be used for keeping plates warm. A cool lifting handle is provided. The fires are finished with heat-resisting synthetic enamel to give a marble effect, and are available in two popular colours in 1- and 2-kW sizes.

In addition to wall-type surround and mantel-surround fires there are two new inset fires of 1 and 2 kW, which have a front frame of close-grain cast-iron finished in vitreous enamel colours. These inset fires can be fixed to a wall without slabs or panels, thus effecting a saving in building construction costs.

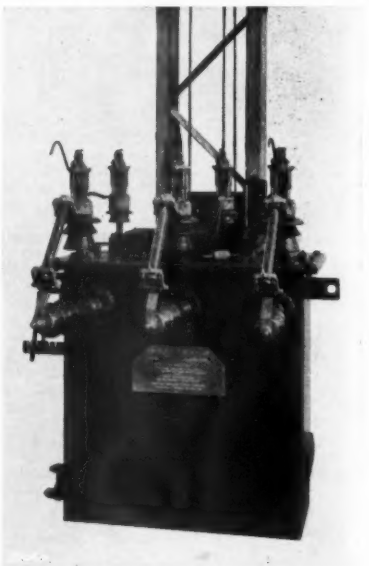
An electric iron, a washing machine, and an imitation coal fire are new lines.

Medium-voltage cartridge fuses up to 800 A have a guaranteed rupturing capacity of 25,000 kVA. Higher rupturing capacities are available in all sizes up to 600 A. The "Skeltag" unit is arranged to accommodate the tag-type cartridge and may be erected against a wall in a similar manner to the skeleton gear. The system, as compared with the straight-through type, saves nearly 18 in. in the height required from the bottom of the cable trend to the top of the bushes. The "Universal" unit has been re-designed, and type 35 has simplified cabling facilities, eliminating all phasing-out difficulties. It may be mounted direct on the wall, as any unit can be erected or removed from the front of the board without breaking the continuity of the bus-bars.

In the "Combination" fuse-switch board for floor mounting, with bus-bar chamber assembly, the high-rupturing capacity fuse is incorporated in the insulated blade of the switch. Two examples of metal-clad distribution boards shown have simplified cabling facilities.

Besides "Zed" fuse fittings and cartridges, and all-insulated house service fittings incorporating high-rupturing capacity fuses, there are internal resistance potential fuses for use without a current limiter; a 180-A 3,300-V fuse having a rupturing capacity of 150,000 kVA, a 400-A, 3,000-V d.c. locomotive fuse; 6,600-V and 11,000-V power fuses; and the pole-mounting r.d. type fuse fitting for rural distribution work.

A range of high-voltage transformers for neon signs, portable and wall-mounting transformers for low-voltage



A "Safety First" sub-station (Better Lines, Ltd.), the l.v. fuse boxes of which are arranged for English Electric cartridge fuses

lighting, and house service meters of the quarterly and prepayment type are represented.

Evershed & Vignoles, Ltd.

Special demonstration equipment for the distant indication, recording, and integration of the flow of gas through pipes is similar to that supplied to Stewarts and Lloyd's new steel works at Corby,

Northamptonshire. A ring gauge originating movement made by George Kent, Ltd., measuring the difference of pressure across an orifice plate fixed in the gas main is connected to an Evershed-Midworth control movement and transmitter, by which the indications are transmitted to a distance.

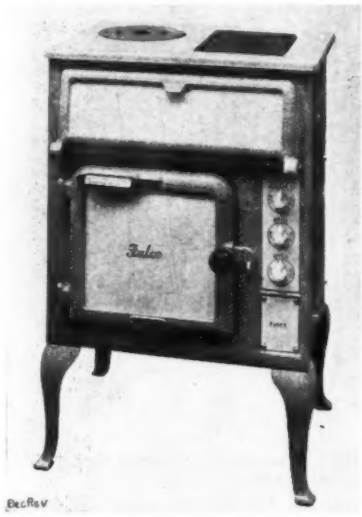
The C. and S. water level indicator (illus.) is unique, inasmuch as there are no electrical contacts in the transmitter or other part of the circuit, the variation in the current which provides the indication being obtained by varying the inductance in the circuit. The accuracy of the reading is independent of variations in frequency and in the voltage of supply.

In the Knowles-Shotter leakage ammeter use has been made of the characteristics of "Mumetal." The moving coil rectifier operated type of indicator or recorder is connected to a transformer and reactor, so constructed that the transformer core becomes saturated at the normal maximum earth leakage current. Any increase in this current has practically no effect on the secondary current, and therefore no harm can come to the instrument.

A development of the "Meg" tester enables the insulation resistance of an installation and the continuity of the lead sheathing or tubing to be measured with one instrument, while there are "Megger" earth and insulation testing sets as well as a range of circuit testing ohmmeters for the measurement of low resistance.

Falkirk Iron Co., Ltd.

The "Falco" exhibit comprises a full range of domestic electric cookers embodying the latest improvements and a



The "Falco" No. 5369 cooker

selection of portable, wall and mantel electric fires, as well as appliances such as breakfast cookers and irons. Among the exhibits is the No. 5369 cooker which we illustrate.

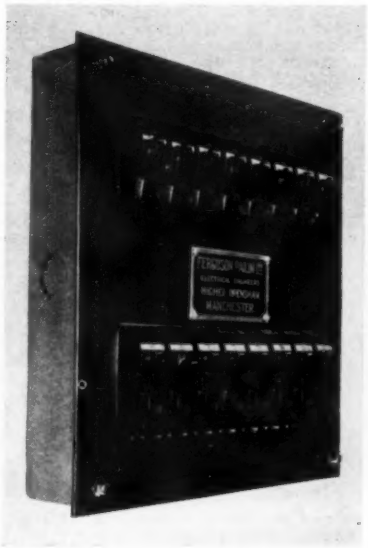
Ferguson, Pailin, Ltd.

Redesigned industrial and motor control gear is displayed which has high-pressure line contacts, reversible main and arcing contacts and simple operating gear. The fabricated construction is used throughout.

The chief feature of a h.v. pole-mounting oil switch shown is the mechanical operating gear, which on the incidence of a transient fault on the electrical system is capable of automatically reclosing the switch a predetermined number of times at definite intervals solely by mechanical means.

Miniature thermal circuit-breakers (illus.) are to be seen which protect a.c. circuits up to 30 A and have the advantage over fuses that their operation under fault conditions is self-indicated, and restoration of the supply is effected without the necessity for rewiring or exposing live metal.

Another interesting exhibit is the magnetic current limiter capable of many uses where over-current protection is required; for example, for current limiting with fixed load tariff, particularly overseas where this system of charging for electricity more generally obtains. For motors, particularly small machine



A Ferguson, Pailin distribution board with type "T.M." thermal circuit-breakers

tools, this form of protection obviates the danger of burning out when "stalled" and the device is also capable of protection against earth faults, and can be readily adapted to meet a variety of particular uses.

Ferranti, Ltd.

In a complete range of meters of all classes, both a.c. and d.c., are polyphase three- and four-wire types, in which the driving elements are spaced around a single disc with an insulated centre of glass. Interaction between elements is much reduced and exceptional compactness and lightness are achieved. A motor-operated model demonstrates the working principles of prepayment mechanism; another machine shows how pivots for meters are ground under microscopic observation to fine limits of shape and size.

Besides an automatic pivot hardening machine there is a substandard meter testing bench with control equipment and a selection of 2½ in. indicating instruments. Electrostatic voltmeters of exceptionally small compass for up to 12,000 V, pocket multi-range test sets, miniature current transformers, relays, and a new synchronous clock with stop-and-start switch are also shown.

The transformer exhibit is designed to show general structural details and the operating principles of voltage control, mercury switch tap changing gear (illus.) being one of the items demonstrated. A new moving-coil regulator of the concentric coil type has very low losses and ample robustness to withstand the internal stresses resulting from short circuits.

Fires for every purpose include portable and wall types and the latest range for the builder.

Among water heaters are examples of automatic thermal storage units of from 1½ to 60 gals. A special model is made with mixing tap and spray for hairdressing saloons. The "Thermolator" enables the user to control the temperature to which the water is raised within predetermined limits.

Bell-ringing transformers made by the company are also on view. The clock section contains types both for wall mounting and for inserting in such places as mantelpieces; also pendant clocks for ceiling fixing.

In the radio section is a receiver in a bakelite cabinet, a new a.c.-d.c. universal set, and a radiogramophone with an automatic record-changing device.

A display of the products of the new Ferranti foundry includes examples of light repetition castings, in both cast iron and "Nomag" non-magnetic iron. Diesel engine pistons and valve parts which are subjected to high pressures in operation, and a large switch frame made of "Nomag" which avoids heating troubles.

George Finney & Co.

Advantages claimed for the latest design of prefiller downstroke and upstroke plastic moulding presses are ease of control, speed of operation, and low consumption of water for the application of hydraulic pressure. In addition to the hand-operated press there is similar equipment with the pump and tank at the side instead of in front, so giving the operator more space and freedom at the front of the press.

Fitz-Gibbon & Murray, Ltd.

This is a display of a special range of anodised aluminium table standard lamps (illus.). They are described as ultra-modern in design and colouring and are provided with angular shades of decorative patterns.

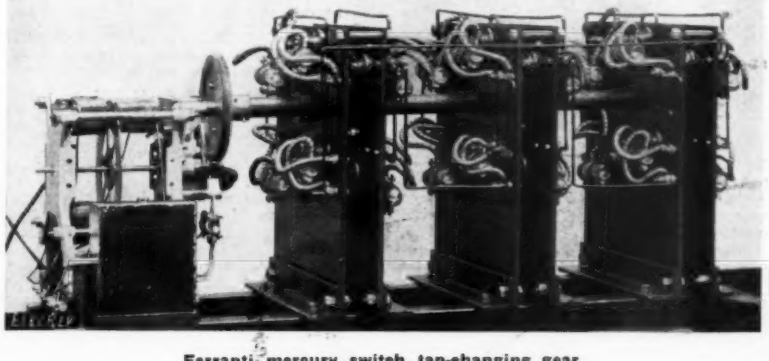
Flextol Engineering Co., Ltd.

Ordinary and flexible disc grinding, sanding, polishing, drilling, screw driving, nut setting, milling, reaming and tapping are but a few of the many applications of these power-driven hand tools. The driving motors and flexible extension shafts are obtainable in various sizes according to the duty to be performed; likewise the hand pieces may be arranged for straight or right-angle drive, with or without increasing or reducing gear to obtain the correct speed desired. When necessary a clutch may be incorporated in the handpiece to give the operator immediate control. These machines can also be arranged to be pulley driven from line shafting, and by petrol engines when necessary.

Foster Instrument Co.

In this large range of indicating, recording and controlling pyrometers and electrical temperature measuring equipment for industrial purposes several new instruments are being shown. A continuous chart recorder of the direct deflection type provides an open record on a 7-in. chart without the complication of the potentiometric method. The instrument is available in flush fitting or projecting cases, has a vibration and shock-proof movement, and the electric clock drive for operation off 50-cycle a.c. supplies is provided with change mechanism whereby two chart speeds can be obtained. Up to six records, each in a different colour, can be recorded on the one chart and a double-pole commutator of the sealed mercury-tube type is utilised.

Automatic temperature control equipment for heat treatment furnaces includes a new "Flexipush" automatic instrument of the indicating type (illus.) suitable for use with oil, gas, or electrically heated furnaces. The main con-

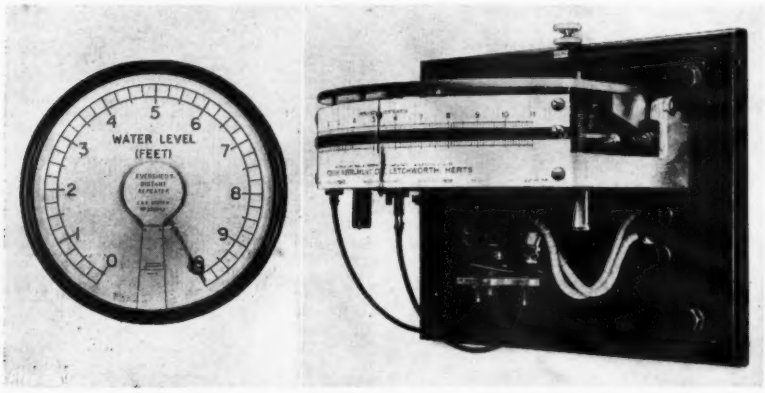


Ferranti mercury switch tap-changing gear

trol is in the form of a large sealed mercury tube switch, tipped to the requisite angle by "Bowden" type transmissions, the pointer being depressed periodically by means of motor-driven mechanism.

With regard to illumination, "Osira" colour floodlighting lamps are shown in six colours, yellow having been added by the use of sodium.

One end of the stand is given up to



The Evershed "C & S" water level indicator and the Foster Instrument "Flexi-push" automatic furnace controller indicator

The indicating movement is relieved of all stresses by virtue of the incorporation of the "Resilia" patented mounting system, and the complete absence of exposed contacts, delicate electro-magnetic relays, or complicated selector mechanisms, should be specially noted. For oil and gas-fired furnaces a range of motor-operated fuel and air valves is to be demonstrated.

General Electric Co., Ltd.

A working model of supervisory control apparatus (illus.) demonstrates its application to power, lighting, and heating equipment. The whole equipment of a number of sub-stations is controlled and supervised over two or four common pilot wires and, in addition, telephone conversation may be effected over the same wires.

Among the advantages of the "Quenchol" liquid h.v. fuse exhibited are that it is non-corrosive, less volatile than usual, has a low co-efficient of expansion, and can be rewired and refilled on site in a few minutes by the user. These fuses are made for all line voltages up to 66 kV and for fusing currents from 1 to 25 A. The h.v. lightning arrester (type M.G.) shown consists of a number of resistance blocks and spark gaps arranged alternately in series. The blocks are made of a ceramic compound, the resistance of which is a definite function of the voltage applied to it.

Private automatic telephone exchange plant suitable for installations of from 15 to 400 lines is shown under working conditions with various types of instruments and services connected to it. The most recent "Loudspeaking S.10" instrument requires only two wires to the switchboard. It allows telephone conversations to be carried on without the necessity of holding a receiver, as the voice is picked up by a sensitive microphone and the reply is reproduced by a moving-coil loud speaker incorporated in the instrument.

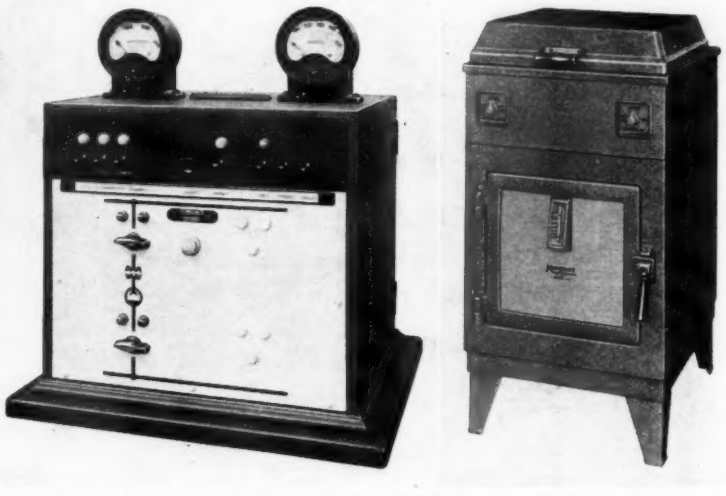
Water heating equipment on view includes examples of storage heaters of the self-contained type, together with separate immersion heaters, external and internal circulators, and thermostats for automatic temperature control. There is also space-heating apparatus, tubular heaters in single and multiple tiers with special terminal boxes, a new 1,500-W convector heater, and an air thermostat.

Ironclad switch- and fuse-gear is well represented; there is a large range of "splitters," special switches for "neon" signs, a 30-A all-insulated switch-fuse, examples of the "line contact" circuit-breakers for heavy currents, "Elf" miniature circuit-breakers for protecting small motor appliances, electric tools, &c., and a portable all-insulated transformer for use with hand lamps.

A selection of measuring instruments includes a decibel meter, an illumination meter, a G.P.O. detector, and an earth continuity testing set.

Installation materials cover all-insulated main switches and fuses. The G.E.C. now possesses at Witton a moulded insulation works for the production of bakelite accessories, and there is on view a complete range of these, with "Wittonite" and meter board insulators and cable racks and rack cleats.

electric cookers, with such optional equipment as the 2¼ kW super-fast hotplate, and a simmering device that provides four-heat control for the fast boiling plate. A 7-in. fast boiling plate is now



Typical panel and apparatus cabinet of the G.E.C. supervisory control gear (left) and the "Magnet" semi-storage cooker

available, loaded to 1,750 W and giving practically the same performance as the old 8-in. 1,800-W plate. The storage cooker has been followed up by an alternative in the semi-storage type (illus.) in which the storage block feeds the hob for boiling, frying, &c., but is entirely insulated from the oven, which is heated by ordinary elements through a change-over switch.

The fire exhibit comprises a display of inset models with stone and cast-iron surrounds and portable reflector models in chromium-plated finish.

Domestic appliances include a washer and wringer with special ironer attachment, cleaners, floor polishers, kettles, irons and toasters. There are also short and medium waves superheterodyne radio receivers for a.c. mains and battery operation.

Gent & Co., Ltd.

Throughout the Fair buildings "Pulsyn-etic" electric impulse clocks are installed, there being some sixty dials in sizes ranging from 6 in. to 30 in., the whole operated by a transmitter or master clock.

For marine electric clocks the transmitter is provided with automatic advancing or retarding mechanism. A new synchronous "Dac-chronometer" transmitter is operated by time-controlled a.c. service mains with automatic maintaining power to provide against current failure. A synchronous motor-operated 4 ft. 6 in. dial has neon illuminated hands and chapters, while process timing impulse and synchronous clocks (illus.)

give audible and/or visible warnings, and there are electric tell-tale clocks for recording on a chart the movements of watchmen, nurses and attendants.

"Tangent" mining apparatus includes new pattern shaft signals, audible and visible; mining bells and relays certified by H.M. Mines Department; improved mining pushes and keys certified as flameproof both for mines and the petroleum industry; certified mining telephones, in iron and wood cases, for surface or underground working; and cordless mining telephone switchboards.

Liquid level, indicating, recording and alarm apparatus of the step-by-step type is operated by battery or from a.c. mains; a new pattern operated from a.c. mains is continuous in action.

Electro-motor syrens include automatically or manually operated morsing and coding types suitable for harbours and docks. There are also luminous inter-office calling sets and mechanical, pendulum and luminous indicators.

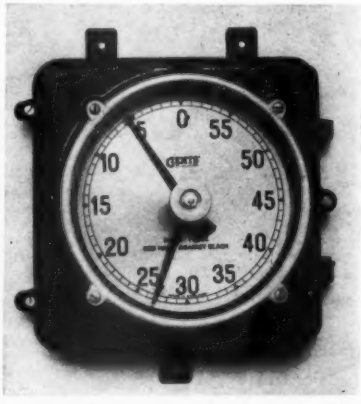
A new automatic fire alarm equipment which necessitates the running of only one conductor round a building provides indication of the source of fire. "Tangent" metal-clad weatherproof bells are suitable for battery ringing or for direct connection to a.c. or d.c. mains.

F. Gilman (B.S.T.), Ltd.

Portable flexible drive tools and attachments for grinding, drilling, wire brushing, sanding and boiler scaling, and examples of flexible shafting form this exhibit. Most of the machines will be demonstrated on specimen work.

Girlings, Ltd.

This company is displaying a selection of "Mosaic" electric fires, cookers,



A process timing clock (Gent & Co.)

boilers, toasters, kettles, auxiliary oven heaters, industrial heating apparatus, soldering irons with stove enamelled and chromium finishes, &c.

Gledhill-Brook Time Recorders, Ltd.

The introduction of the "Monarch" cash register made it necessary to en-

large the company's factory by 12,000 sq. ft. There are three models, incorporating the latest features, which provide a trustworthy cash-checking system. The exhibit also includes a comprehensive display of total adding, receipt issuing, self-closing, coin-exhibiting and multiple drawer, check tills, and a display of semi- and fully-automatic time-recording machines for attendance, time, and cost distribution, including special metal case time recorders for use on bus routes, card recorders for workmen's time checking, portable metal case recorders for outside use by gangs of men, and signature recorders for staff time checking.

Gittings & Hills, Ltd.

Industrial finishes are represented by examples of modern high-speed colour and black treatment, including "Rockhard" stoving synthetic enamel, "Fouramel" and air drying enamels, "Metalard" oil- and grease-proof enamels for machinery, cellulose lacquers for brushing, spraying, or dipping and high-temperature stoving black enamels. One feature claimed for all these finishes is speed in application. The heat-resisting types produce a "nail hardness" after stoving for only half an hour at 200-250 deg. F. They are suitable for such purposes as electric fire fronts and are designed for use where toughness and flexibility are required.

J. Gordon & Co., Ltd.

On the stand of this company a "Duplex" mono combustion recorder for CO$_2$ and CO plus H$_2$ is to be seen in operation. There is also a "Simplex" mono recorder for CO$_2$ only. Both instruments are automatic recording Orsats guaranteed to have an accuracy equal to that of hand apparatus. They are claimed to be simple and extremely reliable and to have been installed in boiler plants ranging from the smallest industrial units to those in large modern power stations.

The "Igema" distance water-level indicator by reproducing the boiler gauge glass at the firing floor overcomes the difficulty on large water-tube boilers of the gauge glass on the drum not being clearly seen at a distance. The company is also exhibiting a "Hagan" float controller, which is part of the equipment used for "Hagan" automatic boiler control, &c. Sample bottles of "Hagan" phosphate and "Santosite" for boiler water conditioning are shown.

N. Greening & Sons, Ltd.

Woven wire in all meshes, metals and gauges is supplied. Also wedge wire in various metals, apertures and sections; perforated plates and plates curved to form screen barrels; wire conveyor belts of every description; mining and metallurgy screens, and wire brushes.

Greenwood & Batley, Ltd.

There is demonstrated a 125-ton screw press fitted with automatic braking at the top of the stroke, and foot and automatic ejection mechanism. Other interesting exhibits are a "Greenbat" trimming press of 25 tons capacity and a 1½-in. hot-forging machine. All are independently driven by "Greenbat" electric motors through "Texropes." Furnaces by Messrs. Alldays & Onions, Ltd., and Messrs. Lucas Furnaces, Ltd., are shown on this stand.

Grimston Electric Tools, Ltd.

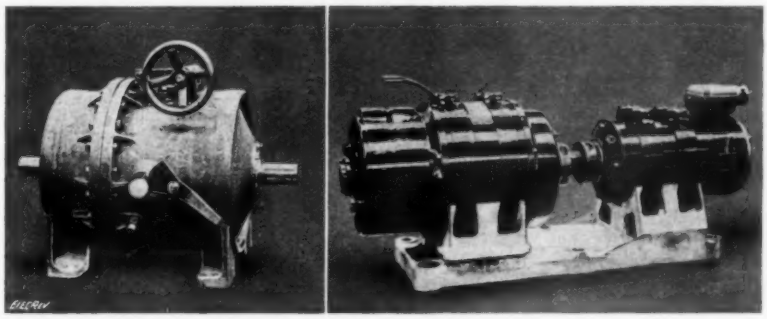
Single- and twin-speed portable drills are arranged for grinding up to ⅜ in. capacity, and duplex three- and four-speed machines up to ½ in. Light high-speed flexible shaft grinders, eight-speed die-sinking machines, single- and four-speed flexible shaft sanders and cellulose buffers, and flexible shaft grinders in 5-, 6- and 8-in. sizes are available with a large range of attachments for sanding, sheet-metal cutting and burnishing.

Precision tool-part machines are shown in three sizes for all kinds of plain internal and external grinding. The 5-in. light sander is a ready means of producing a high polish which quickly reveals hair cracks and flaws in welds. Tool heads are interchangeable, ball bearings are fitted throughout, and the motors have carrying handle and suspension attachments.

Haque & McKenzie, Ltd.

The addition of thirty new shapes and sizes of utensils now brings the range of "Pyramid" aluminium ware up to 150, all specially constructed for electric and hot-plate cooking. There are new ranges of bain marie, sante and santeux pans for use in hotels, ships and institutions; 12in. diameter saucepans, casseroles and steamers; square frying pans, porringers with china linings, shallow twin and triple pans, and patent milk boilers.

The subsidiary, Birmingham Electrical Manufacturing Co., exhibits such domestic equipment as irons, kettles and toasters. A newly designed "Pyramid" iron is said to minimise fatigue in use. It is fitted with a 45 deg. entry "Anka" connector.



Haslam & Newton hydraulic variable-speed power transmission unit (left) and low-voltage trolley-bus lighting equipment, the motor of which is designed for connecting directly to the 500/600-V line while the generator provides a 24-V supply

Harland Engineering Co., Ltd.

New "HI-VE" metalclad switchgear is exhibited for the first time. It is of the horizontal isolation, vertical examination type and one of the major features is that the width of the unit is identical with the width of the oil circuit-breaker tank, thus resulting in small dimensions yet maintaining, and in some cases increasing, the usual electrical clearances.

The stationary portion contains only the bus-bars embedded in compound, a trifucating box and plug receptacles provided with automatic safety shutters. The remainder of the gear is accommodated within the draw-out portion and can, therefore, be completely isolated. The current and potential transformers are within the centre chamber of the draw-out portion, the heavy base of which forms the oil circuit-breaker top-plate. The hinged cover plate accommodates the whole of the tripping mechanism and the majority of the link mechanism of the breaker. In addition the auxiliary switches, mechanical and electrical indicating devices, interlocks, secondary contacts and all internal wiring are concentrated within this section. Thus the control and operating system is centralised. By raising the cover-plate on hinges at the rear the transformers and all main internal connections, which are contained in the oil-filled centre chamber, can be readily inspected. Six current transformers can be accommodated within the oil circuit-breaker bushings, and a further three within the centre chamber of the draw-out portion.

G. A. Harvey & Co. (London), Ltd.

An extensive range of perforated metals of the innumerable patterns needed for all kinds of sifting, sorting, filtering and grading such diverse materials as coal, stone, cereals, food products, and chemicals is available with slots 1¼ in. by ⅜ in. wide through ⅛ in. thick steel to round holes 0.015 in. in diameter.

Woven wire cloths are produced in all metals and gauges, and "Harco" patent "Metalace" is an achievement in wire-weaving. To the strands at right angles to each other additional strands are incorporated diagonally, with the result that woven designs of a highly ornamental character can be produced. Mild-steel gutters, ventilators and gilled tubes are much lighter than those made of cast iron and increased surface for heat transfer by radiation and convection is afforded by the gills. The company makes perforated ornamental metalwork for radiator covers, grilles, ventilating panels and pipe guards and specialises in the manufacture of plant needed in food production and the chemical industry and steel equipment for offices and works.

Haslam & Newton, Ltd.

The hydraulic variable-speed power transmission (illus.), a 100-h.p. example of which is shown in operation, has been in process of development for the past four years, and is now being placed on the market in a range of standardised units for various horse-power outputs and speeds. This power transmission consists of a pump unit from which the delivery can be varied, and a motor unit of fixed volumetric capacity, coupled together into one circulatory system. By varying the delivery from the pump unit speed variation of the motor unit, and consequently of the output shaft, is obtained. The pump and motor can be supplied as one self-contained unit or independent units arranged for coupling together by piping can be furnished.

The transmission is ideal for use with internal combustion engines and other prime-movers, the most economical working of which is at a fixed speed, and it functions within certain limits as a torque transformer, as well as an infinitely variable speed gear, from its maximum speed to zero, and the overall efficiency is remarkably high. It has been tested with marked success for Diesel locomotive transmission by one of the leading railway companies. It also provides a highly efficient variable-speed gear for use with a.c. squirrel-cage induction motors which, incidentally, can thus be started under "no load" conditions. The pump unit can be supplied alone as a constant high-pressure variable-delivery pump for the supply of fluid power to ram-operated machinery.

Examples of special electrical products shown include lightweight generators and rotary transformers for aircraft lighting, heating and radio power purposes, and for field service use; a pedal-driven double output generator on a folding tripod stand, intended for the Oxford University Arctic Expedition which starts this year; spinning motors for artificial silk; and a low-voltage trolley-bus lighting motor generator (illus.).

L. G. Hawkins & Co., Ltd.

In the base of the "Compact" ladies' novelty lamp (illus.) is fitted a comprehensive compact make-up outfit, the cover containing a mirror. Switch control is provided and the shade is adjustable. It is finished in attractive enamel, inlaid with chrome, three colours being available.

The "Compact" ladies' novelty lamp

A new style of domestic lighting fittings offered in three pastel colours is known as the "Crystaline," being constructed almost entirely of glass, the edges of which are finished with a cry-

stal scintillating effect. Many of these fittings pack flat and are therefore most suitable for export purposes.

The main feature of "Adaptolite" adjustable standards is the simplicity of all adjustments, which can be made with the finger tip to any required position. They are finished in black and chromium, green and chromium, and ivory and chromium, and there are twin models for double desks, sliding rod models, wall models and floor standard designs.

The "Cozilite" is an inexpensive table lamp with glass base in six colourings and decorations. Combination lamps comprising electric cigar lighter, table standard with tinted shade and switch, electric clock and ash tray of three designs are supplied in oak, mahogany or walnut. "Supreme" cigar lighters only are made in chromium and black with push-button switch.

Henderson Electrical & Wireless Service

Ironclad switch- and fuse-gear form the feature of this stand.

Alfred Herbert, Ltd.

Besides small tools and machine-shop accessories displayed on one stand coal

Automatic coal stoker (Alfred Herbert)

pulverising is demonstrated. The fuel is used for firing two forging furnaces, one for heating small bars for the manufacture of bolts and rivets and the other for general forging and stamping work.

A "Redler" elevator transfers the coal to an overhead bunker and thence to the "Atritor" which dries, pulverises and discharges the coal into a cyclone seperator, the coal falling into a receiver and the air passing to a bag filter or to the primary air fans, as desired. A feeder (illus.) is driven by a variable-speed motor and delivers the pulverised fuel to the burner of the furnaces, the temperature of which can be easily controlled by varying the speed of the motor.

Each furnace is provided with a motor-driven fan, the speed of which can be adjusted to give the proper proportions of coal and air to ensure the most efficient combustion.

Heyes & Co., Ltd.

A comprehensive display of electrical specialities includes the well-known "Wigan" prismatic and "Lacent" fittings. Flameproof lighting equipment forms another section of the exhibits, the range covering typical examples of both the industrial and mining type fittings which have been tested and certified.

Small flameproof air-break switches, suitable for lighting and small power circuits, are to be seen, while "HeyescO" and "HandcO" bells, "HandcO" relay bells, "HandcO" relays, ringing keys, pull keys, &c., appear in the signalling equipment section, and magneto, battery call and relay telephones and cordless switchboards are shown.

Higgs Motors, Ltd.

Besides a range of industrial motors of standard types there are fractional h.p. and geared machines, together with stator and rotor units for building into the machine to be driven. Bench drilling machines, polishing motors and electric tool grinders are shown with various parts and accessories used in manufacturing the types of equipment mentioned above. A working exhibit is a notching press manufacturing stator and rotor plates in large quantities.

The company is maintaining a service of private cars between the Fair and its works for the convenience of visitors who wish to inspect its manufacturing processes.

Holden & Hunt

Electric welders of every description go to make up this exhibit.

David Hollander & Sons

This firm is showing various types of electric table and floor standards, desk lamps and other lighting fittings.

Hope's Heating & Lighting, Ltd.

An electrically controlled ventilator opening gear is displayed in a manner approximating to actual building conditions among the exhibits of this company.

Hurley Machine Co. (England), Ltd.

"Thor" electric washers will be demonstrated continuously on this stand.

Imperial Chemical Industries, Ltd.

Non-ferrous metals in sheet, strip, rods, tubes, plates and wire include "Broduit" copper conduit tubing, "Broternal" condenser tubes, copper expansion joints, &c., which have been brought within the range of I.C.I. products by the absorption of two Lancashire firms, the Broughton Copper Co., Ltd., and John Bibby, Sons & Co. (Garston), Ltd.

An electrically heated hydraulic press demonstrates the actual process used in making the products of Mouldrite, Ltd., such as electric fire hearths made from moulded tiles.

Thermo-plastic "Leukon," which is sold in granular form, has an exceptional capacity for colour; its resistance to moisture and high dielectric qualities suggest uses for medical and hospital equipment and in the electrical industries—particularly for the production of small electrical bobbins, coil formers, &c.

Among several types of I.C.I. metal-degreasing plant will be an electrically heated "VL" type for hand-operation of the kind now used in the light metal industries and a continuous plant for degreasing either wire or strip.

Nobel Chemical Finishes, Ltd., have this year chosen a new way of displaying their products in a modern living room and kitchen whose contents are finished with Nobel paints and varnishes; for instance, electric light fittings with cellulose lacquers and electric fires and radiators with heat-resisting finishes. The kitchen will illustrate the use of synthetic and cellulose materials on refrigerators, water softeners, panel heaters, and electric lighting fittings.

International Combustion, Ltd.

Samples of "Unifloc" flocculating reagent are being displayed as (a) 100 per cent. "Unifloc" and (b) diluted to 20 per cent. with water, which is the consistency normally used for flocculating purposes. This reagent is perfectly stable, so that it is unnecessary to make up fresh supplies daily. Samples of lime from Limestone Products, Ltd., Abergele, North Wales, are exhibited, hydrated lime being used for correcting the pH value of effluents before flocculating the solids in suspension by means of "Unifloc" reagent.

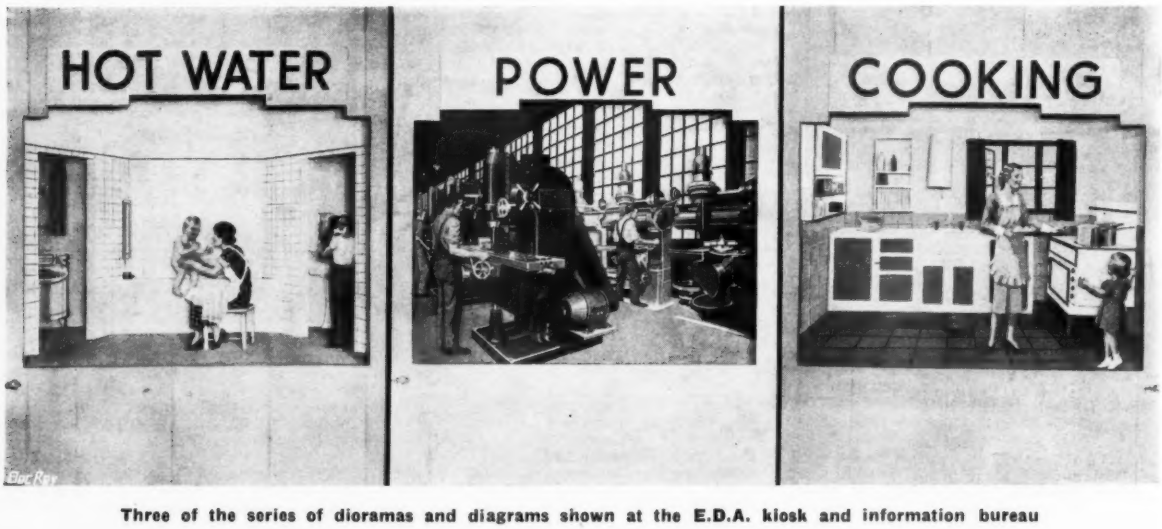
A model is used to demonstrate the action that takes place in a Hardinge thickener when flocculated slurry is fed into it continuously. A copper tank is used, but glass windows are provided so that the reaction can be clearly observed. At frequent intervals a suspension containing solids which normally settle slowly is being treated with "Unifloc" reagent so as to flocculate the solid particles and cause them to descend rapidly.

A 3-sq. ft. "Rovac" rotary vacuum filter is being operated periodically under actual plant conditions, using a flocculated coal slurry as feed. The coke obtained is quite friable and this demonstrates clearly that with the filter it is possible to obtain a valuable, well-drained, coal product either for coking or for use as boiler fuel.

There is a model of the successful plant which has now been in operation for several months at the Emlyn Collieries, South Wales. The scale of this model is ½ in. to 1 ft. The "Hardinge" thickener tank is empty in order to show the internal mechanism. "Unifloc" reagent and lime are used for treating the effluent before it reaches the thickener and the feeding system used can be clearly seen.

Ioco Rubber and Waterproofing Co., Ltd.

Insulation products comprise "Linapex" cloth, silks, tapes, papers and slot (including magnetic slot) insulation. Also "Formapex" miocartas with a paper base for high-voltage uses and with a cloth base for low-voltage and mechanical applications, suitable for transformers and switchgear, plain and condenser type bushings; insulation for tramway overhead lines; oil-resisting sheets and tubes; varnish and varnished papers, as well as "Ocobind" black ad-



Three of the series of dioramas and diagrams shown at the E.D.A. kiosk and information bureau

hesive tape and "Artoco" veneers and panelling for interior decoration.

J. Ismay & Sons, Ltd.

This company and its associated concerns, including H. C. Rawson (Sheffield & London), Ltd., are exhibiting refrigerators, washers, cleaners, radio apparatus, &c. The new "Zeros" refrigerator shown is British made and is air-cooled, work-

The "Connor Thermo" washer

ing on the "Normelli" system, which has been used on the Continent with conspicuous success. "Connor Thermo" washers are shown fitted with an improved type of wringer. The chassis is rigidly constructed and equipped with a specially built rubber-mounted motor. A companion to the washer is the "Connor" two-speed ironer, which is also exhibited. It is thermostatically controlled and knee control is provided. A low-priced cleaner on view is the "Electric Dustflow," which has a well-insulated, high-speed motor that runs quietly. Radio apparatus displayed includes the "Halcyon" walnut cabinet table model and "Halcyon" radiogramophone. They are suitable for either a.c. or d.c., and it is claimed that the anti-interference circuit is so efficient that even electric lifts nearby do not cause annoyance.

Jackson Electric Stove Co., Ltd.

In the "90" series of cookers are two entirely new models (the 92J and 93J), which are designed and constructed on the lines of the well-known 91J. A feature of importance is that parts are interchangeable. The large food capacity of the oven is maintained, and the elements are mounted in the sides so that cooking can be carried out on the floor of the oven.

There is a range of portable, light cast fires in various vitreous enamelled finishes, in addition to the inset type introduced last year for tiled or other surrounds. The inset fires are made in 1-, 2-, and 3-kW sizes and are finished in chromium plate, and also in various coloured vitreous enamel finishes.

Examples of domestic storage water-heaters conform with the E.D.A. Water Heating Committee's recommendations. What is claimed to be a new departure in electric wash-boiler design is an appliance of 10-gal. capacity which has foot-press switches mounted on the front. The outer case is finished in grey coloured vitreous enamel finishes.

The hotel and restaurant cooking apparatus section is comprehensive, and includes examples of up-to-date equipment for large-scale cooking purposes.

Johnson Matthey & Co., Ltd.

Platinum contacts ranging from the size of a pin head up to ¼ in. diameter in various styles are shown, some of which are produced entirely by machine while others are finished by hand. There are also magneto screws tipped with contacts of guaranteed dimensions (10 or 25 per cent. iridio-platinum) and thermo-couples consisting of a pure platinum with a platinum rhodium alloy wire, or a pure platinum with a platinum-iridium alloy wire, for use in measuring high temperatures.

In addition to standard silver contacts there is a display of gold-silver alloy, fine silver and platinum-gold-silver contacts. Of silver fuse wires a number of different gauges are supplied, mainly for fusing at 3 to 45 A. Various demonstrations are being given of the applications of "Tenacity" brazing alloys. There are specimens of the corresponding "Tenacity" fluxes for use with these alloys. Another brazing alloy shown is "Sil-fos," which contains silver and phosphorus. It has peculiarly tenacious properties, and for certain applications, notably on brass and copper, it is very economical and efficient in jointing.

Very fine nickel-chrome resistance wires are produced, mainly for use in special sensitive electrical instruments where a particularly delicate resistance coil or wire is employed. Copper coils are supplied for use in high-frequency electric furnaces and for cooling plant. Precision brass parts are produced in brass alloys and the usual types of turned, tapped and knurled pieces can be supplied. Accurately produced repetition work is undertaken for pieces not exceeding about 2½ in. in length or about ¾ in. diameter.

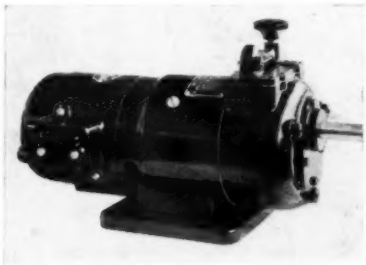
R. Johnson & Nephew, Ltd.

Iron, steel and non-ferrous wires are made for all electrical purposes, including trolley wires, overhead power lines in copper, cadmium-copper, steel-cored aluminium and steel-cored copper, and electrical strips of all sections. Also "Crapo" galvanised solid steel and stranded wires for earth lines and stays and iron and steel wires of interest to wire users generally.

Klaxon, Ltd.

A comprehensive range of fractional h.p. motors (illus.), includes geared machines ranging from an output of 0.6 lb.-in. at 300 r.p.m. to the U.G.H.-type which is capable of exerting a torque of 2,000 lb.-in. at low speeds. Standard units are supplied for practically any speed requirement from 0.5 r.p.m. upward, and lower speeds can be provided if desired. These units are applicable to remote switch control, valve operation, etc. Motors are made up to ⅛ h.p. of the universal, shunt, compound, split phase, synchronous, capacitor, and two- and three-phase types.

A range of grinding and polishing



The Klaxon RG3 two-speed geared motor unit

machines is also made, a geared model of the multiple unit being available for low speeds for special applications. Other items are flame-proof mine, marine and industrial signals; staff locators, motor cycle horns, hooters, buzzers, syrens with a range of 1.5 miles in still air, and telephone relays.

Laurence, Scott & Electromotors, Ltd.

The main items are two hyposynchronous motors, one of which will be operating as a working example. A range of "steel frame" motors of from 1 to 50 h.p. has been entirely redesigned and improved. In addition, there is a new range of fractional h.p. three-phase machines and an improved range of single-phase motors of the capacitor-start type. Flame-proof motors for mining purposes, mill type motors for driving line roll gear and similar applications, and Burke-Scott welding machines are also on view.

Lectro Linx, Ltd.

A full range of electrical plugs and sockets will be exhibited, embodying new patent collapsible contacts.

Leda Electric, Ltd.

An ice cream freezing and storage cabinet produces 10 gals. per day and can be made with additional storage sleeves if required. All controls are located on a centralised panel for easy access and an enamelled sheet steel exterior with corner strips, and stainless steel top and lids, complete the external arrangements. The domestic refrigerators with internal capacities ranging from 2 cu. ft. upwards are all-steel, the exteriors being finished with triple baked non-chipping white synthetic hard enamel, and all interiors are lined with white porcelain enamel with corners rounded to facilitate cleaning. All models are fitted with hard brass chromium-plated hinges and fasteners, with interior removable bar type shelves. Each model is fitted for making ice in conveniently shaped cubes.

The polished oak sectional multi-door service cabinet for hotels, clubs, cafés, &c., has a roomy interior lined with stipple glaze asbestos sheeting and fitted with adjustable tinned wire shelves. It is insulated throughout with corkboard and fitted with chromium-plated hinges and fasteners. All models are operated by fully automatic refrigerating units.

London Aluminium Co., Ltd.

On this stand will be seen utensils for electric hot-plate cooking.

London Electric Wire Co. and Smiths, Ltd.

In this joint exhibit (incorporating Frederick Smith and Co., Ltd., Salford) of all types of bare and insulated electrical conductors, special attention is directed to "Lewbestos" wires and strips which are used in place of cotton-covered conductors for the windings of motors subject to high temperature rises, the special asbestos covering affording greater protection against burnouts. Also they are now employed in the manufacture of heat resisting and fire-proof flexibles for shop-window, showcase, stage lighting, hospital lighting, and in many other cases where the risk of fire is present by the use of ordinary flexible cords.

"Lewcos" super-quality enamelled wires, cotton-covered, silk-covered and paper-insulated wires, bell wires, dynamo flexibles, copper braids, etc., are other products of the Leyton works.

Commutator bars, specially manufactured shapes and sections in copper and copper alloy, strips, rods and busbars are among the exhibits from the Salford factory and some very fine sizes of copper wire for use by the electrical and radio industries.

"Anacos" trolley wires, said to be the first to be manufactured in copper cadmium in England, are also given prominence, while a special type of earthing rod is manufactured for every radio and electrical purpose.

London Electronics (Machinery), Ltd.

Shown for the first time is a die- and form-cutting machine, fully automatic and built for heavy-duty work on steel and alloys. The operation of the cutting tool is continuously controlled by means of a photo-electric cell, which device is utilised not only as an on-and-off switch and to limit certain movements of the machine, but also to actuate the cutting tool in a manner analogous to the moving-coil in a sound reproducing loud-speaker.

J. Lucas, Ltd.

Among the newer improvements introduced recently is the prismatic acid-level indicator which is fitted to Lucas replacement batteries. This device consists of two small circular windows let into the lid of each cell. When the acid is at its correct level one window is dark, the other light, while when the acid falls below the safe minimum level both windows become light.

A new battery feature is the reinforced partition which eliminates the possibility of inter-cell leakage. The material is an extremely tough fracture-resisting compound which is not affected by sudden changes of temperature.

Special non-sulphating cable connectors are another battery improvement. They are of special alloy which definitely resists sulphation even under the most trying conditions. A wind screen spray is exhibited which consists of a small unobtrusive nozzle, a concealed tank, and a plunger which is fitted to the steering column. Whenever required twin jets of liquid can be projected on to the screen, washing away accretions of dried mud, &c., and enabling the wiper to be effective at the first stroke.

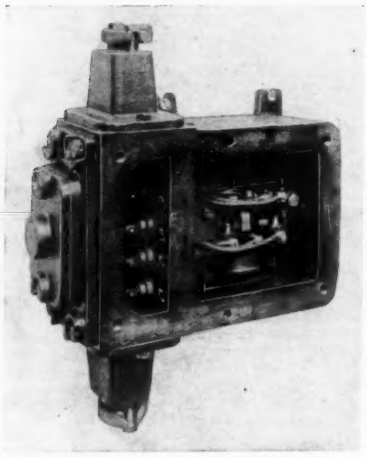
Electric wind horns built on a new principle are on view. They give a pleasing mellow sound and are arranged to give two either loud or medium blasts.

A representative range of lighting, starting and ignition equipment to suit all types of motor cars, motor cycles and pedal cycles is displayed.

In addition to the well-known Lucas, C.A.V., and Rotax accessories, a characteristic feature of the stand is a very wide range of exhibits for modern garage and service station requirements and industrial purposes. The products include portable electric tools (both universal and high-frequency), battery charging plant, electrical testing equipment, cylinder reboring plant and static rectifiers for the economic conversion of a.c. to d.c

M. & C. Switchgear, Ltd.

Metal-clad oil circuit-breakers varying from 30 A to 1,600 A are exhibited. There is a motor starter in which the switch and fuses are totally immersed in oil, thereby rendering the whole assembly suitable for use in moist, vaporous, and hot steamy atmospheres. Various straight-on-the-line push-button starters (illus.) are to be seen. They include one in a flameproof enclosing case, a star-delta type, and a reversing pattern in which two contactor starters are so interlocked that only one can be closed at a time. A special advantage of this design is that the interior forms a complete starter in itself and is most convenient for building into purchasers' own enclosures or machine tools.



An M. & C. Switchgear a.c. push-button straight-on-line starter

For electric heating control an electrically operated contactor of the latched-in type is claimed to be silent and devoid of hum, which may be objectionable in public buildings and residential flats. Flameproof equipment ranges from oil-immersed metal-clad switches to remote control gear, and includes a new d.c. design. The cubicle draw-out assembly for industrial use is represented by 30- and 200-A examples of a compact form that conserves floor space. The metal-clad switch and control gear is especially suited to overseas requirements, and to varying and adverse atmospheric conditions.

McKechnie Bros., Ltd.

In this display of metal sections, stampings and pressings there are extruded sections and hollow bars applicable to many uses in the engineering and electrical trades.

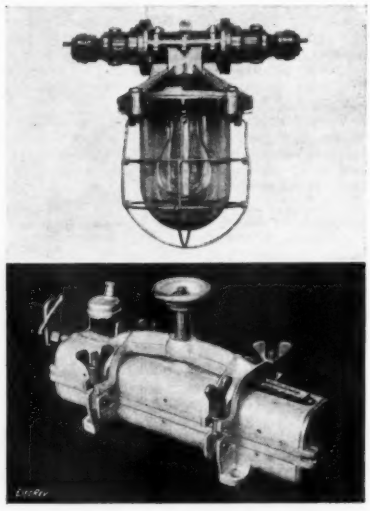
Donald Macpherson & Co., Ltd.

"Foochow" oriental lacquer finishes for electrical appliances of all kinds comprise heat-resisting materials for the treatment of electric fires, cookers, refrigerators and also switchgear enamels and preservative paints for pylons and other steel structural work.

Used electric cookers are shown renovated in attractive mottled finishes and the company claims a saving in time for application of, in some cases, as much as 75 per cent. Especially is this apparent in the production of heat resisting and durable coloured finishes by low-temperature, short period stoving methods. The latest decorative materials are suitable for showrooms, offices, and all interior and exterior painting and decoration.

Macintosh Cable Co., Ltd.

The improved electrical vulcaniser (illus.) is now provided with a thermometer and a thermostat. It is proving increasingly popular in mines, quarries, docks, wharfs, &c., for quickly and economically repairing the sheathing of



A new Macintosh well-glass fitting for colliery lighting (above) and an improved electrical vulcaniser

flexible trailing cables. The apparatus weighs approximately 29 lb. and is rated at 500 W. It will cater for cables from ⅝ in. to 2 in. diameter.

In the company's colliery lighting system the 100-W well-glass fitting (illus.) is now arranged so that the cable-end box provided can be directly plugged into the lamp fitting. As straight-through connections are incorporated at the head of the lamp it will be seen that the lamp fitting can be inserted at any point of the cable run where a straight-through box (two cable-end boxes) is fitted. An adaptor is included for attachment to switchgear, transformers, &c., to enable a cable-end box to be directly plugged into such apparatus. This has at one end a flameproof flange of suitable dimensions for coupling to apparatus and at the other end a flange suitable for coupling up to cable-end boxes. The whole of the fittings in the system are made of non-ferrous alloy.

Also on this stand are the component parts of the Macintosh mining-type cable-end sealing and coupling system for power circuits.

Marco Refrigerators, Ltd.

The all-steel domestic refrigerators shown have capacities of from 3 to 10 cu. ft., catering for from three to a dozen people. The largest of the four cabinets has double doors, while snap-action fasteners and white porcelain enamel interiors are provided. There is a control switch giving five freezing speeds for ice-making.

Commercial models are available in great variety, including cabinets and built-in cold-storage rooms, fish tanks, refrigerated food counter and display cabinets, dairy cooling equipment, and ice-cream freezers and shop storage cabinets, either singly or combined. Commercial service cabinets of the multi-door design are constructed on the sectional principle on a steel-lined frame. In the four "Astoria" models, which have capacities of from 20 to 60 cu. ft., provision is made for the production of from 6 to 15 lb. of ice per freezing.

Martindale Electric Co., Ltd.

The "Jiff-V" mica undercutter (illus.) is a pistol-grip hand tool driven by a small motor that vibrates a thin V-shaped file backwards and forwards at high speed. Slotting files of various shapes are exhibited, as well as "Commulac," which is an insulating liquid for painting slots in undercut commutators to minimise the risk of short-circuiting.

Portable hand blowers driven by motors up to 1 h.p. and developing a nozzle velocity of over 400 ft. per second are made for cleaning out machinery, while attachments and a dust bag are available for suction cleaning.

A voltage tester is supplied to indicate from 110 to 550 V a.c. or d.c., and also an etching outfit, operated by a transformer off a.c. or by a small "Crypto" rotary converter off d.c.

An improved model of the "Super-Syren" is now fitted with 6- and 12-V

The "Jiff-V" commutator mica undercutter (Martindale Electric)

motors in addition to the standard 110- to 240-V range, the machines being waterproof, and their outer aluminium castings are de-aluminised to render them scratch-proof and impervious to marine atmospheres.

Mavor & Coulson, Ltd.

One man only is needed to operate the self-gathering "Joy" loading machine for stocking and reclaiming (illus.). Two gathering arms sweep the material on to the front conveyor, which delivers to the rear conveyor. Hydraulic jacks can raise the gathering head and the rear conveyor, or swing the latter sideways as required. Crawler mounting enables the loader to move from place to place and feeds the gathering head into the pile of loose material. A petrol or light Diesel engine, or electric motor provides the driving power. Different sizes of "Joy" loaders have capacities of from 1 to 4 cu. yds. per minute. An electric generator and lamps are provided for night work, and a screen may be fitted whereby "smalls" are separated and delivered at the side.

A Mavor & Coulson "Joy" loader with generator and lamps for night work

Mek-Elek Engineering, Ltd.

Floor and table standard lamps include both adjustable jointed-arm and

flexible-stem patterns, and a "Handy" wall, bedrail, or table night lamp. One model is easily clipped on to a sewing machine and another illuminates a book rest; they are available for mains or battery operation. Screens are supplied for "daylight" colour matching and, besides illuminated mirrors, lighting fittings have been adapted for attachment to existing mirrors. These are of two kinds, one for screwing to the front of the mirror frame and the other is specially made for folding mirrors. There are also modified types of "Mekelite" fittings for factory use, and rotary neon signs.

Meldrums, Ltd.

The new fan draught mechanical stoker will be on view in two forms. One represents the well-known sprinkler type with fixed grate and fan forced draught, the bars being of the standard patent interlocking narrow section with narrow air spaces. The other is of the "Meldrum" coking type with self-cleaning grate and fan-forced draught. The bars may be of the single type or of the boxbar type having short refilling sections. From the double-walled hollow front a branch duct is taken to give secondary air for smoke prevention, and for cooling the whole front.

The "Meldrum" hand-fired forced draught furnace arranged for steam jet draught is also shown. Also a smoke preventing door for vertical and loco-type boilers and one of the smaller sizes of steel-cased incinerators with a crosstube water heater incorporated in the chimney.

A new type of water heater has been evolved in which the whole surface of water tubes, headers, etc., is utilised as heating surface. A large working exhibit is the destructor in the Fair grounds.

Midland Fan Co., Ltd.

A working demonstration depicts plant for spraying paint, cellulose, lacquers, and enamels, in conjunction with which there are fume-removing fans and air filters, pressure-reducing valves, an air compressor, portable spraying equipment, spraying pistols, and other accessories.

Milne & Longbottom

The open and enclosed type a.c. contactors which are being shown comprise direct-on-line starters, reversing starters and also those for use with capacitator motors. The "Elm" automatic star-delta starters are exhibited with and without interlocked isolating switches, while other switchgear includes knife switches and the "Elm" miniature circuit-breaker, which is shown for overload only and overload and reverse current.

Drum-type reversing and heavy-duty change-pole switches with provision for electrical interlock are available for inspection. The Robinson low-voltage lighting system is shown. This system transforms the a.c. line voltage to 12 V and, using high efficiency gasfilled lamps in suitable reflectors, provides efficient and safe illumination for all kinds of machine tools. A portable design is included in the range. Among other exhibits are push-button and rotary enclosed switches.

Mirrlees, Watson Co., Ltd.

The class "S.C." pump (illus.) particularly commends itself where such considerations as compactness, rigidity and simplicity of erection and operation are important. A self-priming pump is exhibited which has no reciprocating parts, is silent in operation, and occupies only a small floor space. Among the circulators on view is the "Clearway," which is intended for systems in which the maximum circulation is required only at intervals to warm buildings, purely thermosyphonic circulation being sufficient for normal working. To meet cases where lowest capital cost is essential the "Simplex" circulator has been placed on the market. It is of the vertical spindle, axial floor or propeller type, and is driven through an extension of the motor spindle. Standard motors are suitable for three-phase, 50-cycle, l.v. supply in both cases, but special units can be provided.

Mitchell Electric Co., Ltd.

This display will comprise "Wizard" electric irons, "Mitchell Lightning" and "Mitchell Perfection" kettles, "Meco Brownie" toasters, "Mitchell Civic" inset fires, "Britisher" and "Meco Junior" bowl fires, coffee percolators, &c.

Moffats, Ltd.

A comprehensive range of the latest "Moffat" electric cookers (including colour finishes) and heavy-duty ranges; also two models of the new "Streamline" refrigerators.

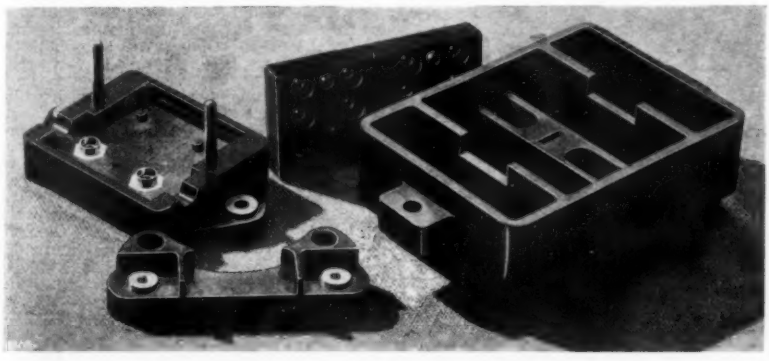
David Moseley & Sons, Ltd.

This is a display of rubber goods, such as flooring and perforated mats, sheeting, tubing and belting; also lamp standards and electricians' gloves and gauntlets to withstand voltages of from 3,300 to 10,000, made in two weights and lengths and three sizes and thicknesses.

Ebonite sheets, rods, and pipes are also made and hard fibre specially suitable for insulating purposes is supplied in large sheets of various thicknesses, as well as light rubber and canvas hose for insulating cables.

Moulded Products, Ltd.

This firm specialises in moulding for the trade in all classes of synthetic resin materials, including bakelite, and high-grade mouldings applicable to the electrical trades (illus). These include mouldings for telephones, all types of



A selection of mouldings manufactured by Moulded Products, Ltd.

switchgear and a large number of electrical accessories.

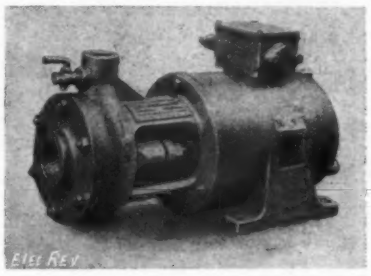
The special features of "M'Prolite" moulded electric lighting fittings are the adaptability and simplicity of assembly of the components. With one set of components a wide variety of arrangements for holding both upward or downward lamps can be achieved easily and quickly. Modern in design these fittings are moulded in a great variety of attractive colours to suit modern decorative schemes, while shades are supplied if required.

National Time Recorder Co., Ltd.

Here will be exhibited time recorders, costing machines, and electric clocks of all descriptions.

J. Neill & Co. (Sheffield), Ltd.

The "Eclipse" non-electric magnetic chuck placed on the market this year is being shown. The specially designed permanent-magnet system employed in conjunction with the arrangement of the pole pieces gives a larger number of areas of high flux concentration, which enables both small and large objects to be securely held. The movement of a handle on the side of the chuck releases or secures the work by moving the magnets in a horizontal plane relative to the



A Mirrlees Watson class "S.C." pump

high permeability pole pieces cast into the face plate. A 14-in. by 6-in. chuck is capable of exerting a total pull of nearly half a ton.

A range of the latest types of "Eclipse" magnetic chuck blocks and demagnetisers is featured, and the remainder of the stand is devoted to the display of products such as hack-saw blades, frames and saw sets, together with an attractive display of composite and solid die steels. The cutting efficiency of the hack-saw blades is practically demonstrated on a modern power driven hack-saw machine.

Neon Excelda Co.

Neon signs of all descriptions, including patent two-way interior luminous tubes, tubular lighting, and box signs will be on view.

Nuway Electrical Accessories Co.

Bakelite electrical accessories and thiefproof lampholders are this company's principal exhibits.

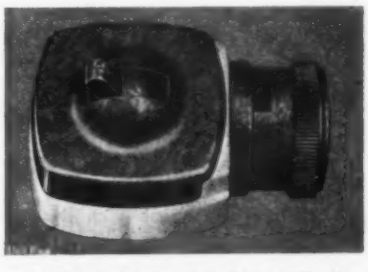
C. H. Parsons, Ltd.

Foremost among the additions to the "Little Briton" range of accessories are 15-A end-entry switchplugs (either 2-pin or 3-pin and flat or hollow back) and a 15-A switch, all available in the standard range of seven colours.

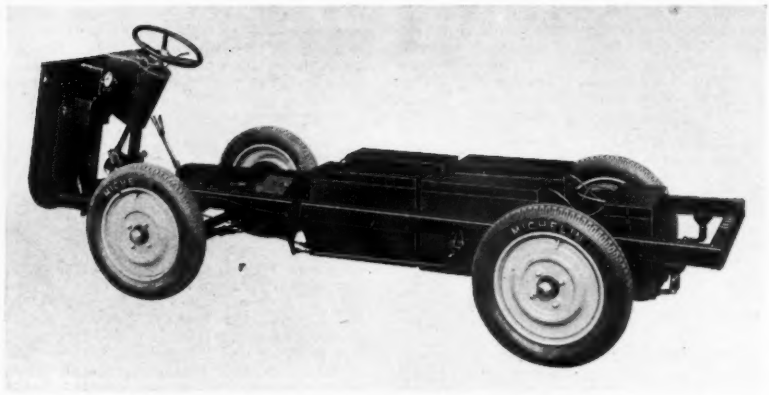
The intermediate switch and bell pushes exhibited are available in surface, semi-recessed and flush types, in a range of eighteen colours. An already comprehensive range of front-entry switchplugs has been further extended by the introduction of 2-A, 2-pin and 3-pin switchplugs, surface (both flat and hollow back) and flush types. These employ the standard 5-A quick make-and-break action, which enables them to have a fully insulated action and, in consequence, a metal flush unit can be offered. Of interest for industrial installations is the introduction of a ceiling switch on a special base enabling it to be mounted directly on to a universal box, without the use of an adaptor plate. Switch plates, both metal and bakelite, ironclad industrial units, and lampholders are also on view.

Partridge, Wilson & Co., Ltd.

These makers of "Davenset" commercial battery-charging plant are featuring battery-propelled Wilson electric delivery vehicles (illus.) together with accessory equipment. In addition to the exhibits on the stand, a fleet of works interdepartmental vehicles is being used to convey buyers from stand to stand, while for a month before the opening of the Fair similar vehicles were employed for



A 15-A end-entry switchplug (C. H. Parsons)



A Partridge, Wilson model "LW" electric vehicle chassis

the conveyance of exhibitors' goods. (See "Business Notes.")

The Wilson automatic fluid controller is a patented device giving pre-selected acceleration, and its inclusion is claimed to render this make of electrically propelled vehicle foolproof and the simplest to drive.

The range of "Davenset" fully automatic vehicle battery charging rectifiers will be represented.

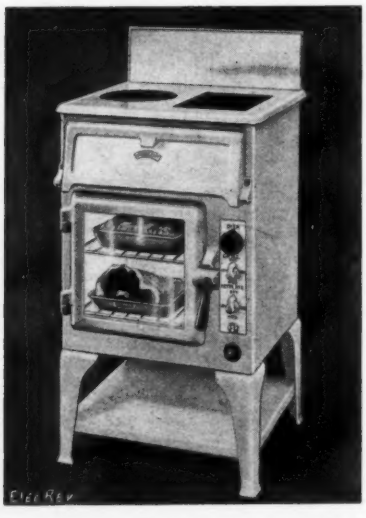
P. B. Sillimanite Co., Ltd.

An extensive range of electrical formers incorporating "Sillimanite" illustrates the uses of this material for increasing resistance to heat, thermal shock, and electrical pressure. The requirements of the electrical trade are catered for by the preparation of specially graded qualities for each purpose, the material being treated in a new plant to remove all impurities, especially iron that comes from the mills used to grind the material.

The use of this substance in electric furnaces has been known for some years. It is now becoming one of the recognised materials to use in making the "cement filled" boiling plates fitted to many modern electric cookers, for which particular purpose a special grade has been evolved. A boiling plate filled with "Sillimanite" special cement is claimed recently to have beaten an open type of plate in speed of boiling.

Albert Phillips, Ltd.

Built-in panel wall fires are fitted with baffles so arranged as to direct all the heat into the room, each element being controlled by a separate switch. No. 120 "Crescent-glow" artificial coal fire has a projection at the back designed to fit into the existing fireplace opening, the



The "Crescent" electric cooker (Albert Phillips)

frame edge being flush with the tiled surround.

Among cookers the principal item is model 130, which is finished in grey mottled vitreous enamel both inside and out. It is provided with side and bottom heating by means of twelve low-loaded mica-wound elements and plug-in elements with three-heat control and earthing all enclosed in nickel steel alloy casings. The "M.K." plugs and sockets are floating to ensure accurate alignment and they may be arranged for top, side, or bottom heating. The hob is hinged and the hotplate cradle and boiler-griller are mounted on the underside of the hob so that the hot-cupboard is clear and the fuses are accessible when the hob is raised.

Pinchin, Johnson & Co., Ltd.

Examples of this company's latest developments in paints, varnishes, stains, enamels, and lacquers for the decorating trade include similar materials for the protection and decoration of industrial products of all kinds.

Pneulec, Ltd.

Among this foundry equipment there is demonstrated a moulding machine of the jarr type, with the rolling over and pat-

The Premier "Multi-Boiler"

tern drawing operations controlled by oil. It has a turnover plate which measures 20 in. by 36 in. and has a capacity of 750 lb. The machine is the smallest of this series, sizes up to 8 ft. by 10 ft. table and 20 tons capacity being available. The accuracy of the machine is demonstrated by the fact that the mould can be put back on to the pattern and stripped again without signs of crush.

Of sand-preparing machines the "Royer" is a general utility type and the "Silkysand" a disintegrator which produces a fine grade of facing and eliminates any possible breakdown due to scrap in the sand. If scrap is shovelled in it passes through quite harmlessly. The machine will take as much sand as can be shovelled into it, and yet requires only a 3-h.p. motor.

Premier Electric Heaters, Ltd.

This concern has not exhibited at the Fair for some years, having contended that February was not a suitable date. It marks its return in a whole-hearted fashion, for practically the complete range of electrical appliances manufactured is displayed. There are numerous attractive designs of fires, including upright types with double radius fire-bars, modern designs incorporating moving smoke and flame effect and inset, and bowl fires, all being in the latest pastel colours or metallic finishes.

The "Smoothwell" and "Laundwell" domestic electric irons, as well as heavy irons for laundry and tailoring works are shown, while kettles are represented by the "Accident-proof" and "Quickest" types.

Among the most popular lines are the "Grafton" and "Gresham" imitation coal fires, the "Signal" electric iron, and the new three-heat "Multi-Boiler" (illus). The last mentioned has been designed to take three saucepans, and there is ample room for the utensils to be drawn aside for simmering. It is strongly constructed of cast iron and has a stainless steel shield which concentrates the heat and drains off any liquids which may be spilled. There is also a "Junior" model.

In addition to all these domestic appliances there are industrial and medical lines, such as glue heaters, sterilisers, bronchitis kettles, urns, &c.

Pressed Steel Co. of Great Britain, Ltd.

"Prestcold" domestic refrigerators are made in sizes of from 2.4 to 11.2 cu. ft. storage capacity. There are five single-door models for smaller homes and three double-compartment cabinets for larger houses, each door being separately controlled by a foot pedal.

The combined cooker-refrigerator has a capacity of 3.5 cu. ft. and an oven loading of 1,400 W, a 1,500-W boiling ring, a 1,500-W griller-hot plate, and a warming cupboard.

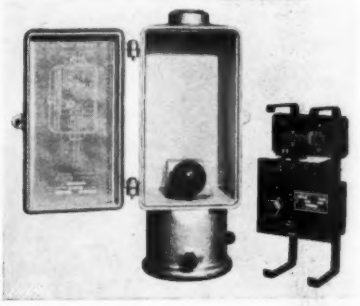
This year a range of all-steel cabinets of 20, 35, and 50 cu. ft. has been introduced at prices which compare favourably with those of wooden cabinets, for hotels, hospitals, and provision merchants. These multi-door models are provided with a ⅓ or ¼ h.p. air-cooled compressor unit, either self-contained or installed remote from the cold chambers. The temperature is automatically maintained between 38° and 45° F.; ice trays are provided and the shelves are adjustable and readily removable for cleaning purposes.

Radiovisor Parent, Ltd.

The standard counting unit for working directly from a.c. mains is more especially designed for use in factories for conveyors and elevators. The apparatus comprises the projector and the receiver, housed in similar cast-iron boxes fitted with small windows, each box being mounted on a bracket that gives universal movement for aligning. The projector contains a low-voltage lamp with lens and focusing arrangement, and a transformer which supplies not only this lamp, but also the filament current for the receiver, which contains both the "Radiovisor" bridge and the valve relay circuit, from which ordinary leads go to the electro-magnetic counter, with which is combined a spark suppressor.

The industrial smoke indicator projects a beam of light across the base of the stack or boiler up-take on to the receiver containing the light-sensitive cell. For keeping the projector and receiver glasses free from deposits either water jets or air blasts are employed; the indicating and recording instruments are made by Messrs. Evershed & Vignoles.

Apparatus for the automatic control of street lamps (illus.) has been improved. The small current from the light-sensitive bridge, instead of actuating a d.c. relay directly or a.c. thermionic valve as heretofore, is now stored up as a charge on a condenser. When equilibrium voltage is obtained, depending on the intensity of light on the bridge, a gas-discharge



A Radiovisor 1,500-W lighting control unit

tube causes this condenser to be discharged through the winding of a polarised relay, which, once actuated in either

direction, holds itself in that position. This, instead of having to deal with a slowly changing current, is now actuated decisively by a sudden and momentary rush of current.

Ransomes & Rapier, Ltd.

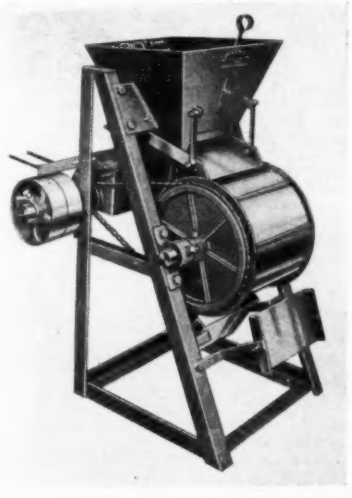
From the electrical standpoint the most interesting exhibit here is probably the 1-ton truck-type petrol-electric mobile crane (illus.), which combines the advantages of a self-contained travelling crane with those of a power-driven truck. The jib can slew through 240 deg. and is able

A petrol-electric mobile crane (Ransomes & Rapier)

to load on to and off its own platform. It can lift 1 ton at a maximum radius of 7 ft. and has a maximum outreach of 11 ft., at which it can lift 9 cwt. The petrol-electric power system provides a separate motor for each motion, the current supply for which is derived from a variable voltage generator direct coupled to a petrol engine of the motor car type; friction clutches and the usual mechanical transmission are thus eliminated. Other exhibits include a new excavator, a 2½-ton, 20 h.p. Diesel locomotive and concrete mixers.

Rapid Magnetting Machine Co., Ltd.

The "Rapidity" (Thompson-Davies prov. pat.) electro-magnetic separator for feebly magnetic ores and materials containing iron of very low magnetic permeability is a new development that



Electro-magnetic separator (Rapid Magnetting Machine Co.)

greatly increases the output, since the feed belt may be run at such high speeds as 100 to 400 f.p.m. against the 20 to 70 f.p.m. of previous machines. The ore remains in the magnetic zone for a period ten times as long as was the case on any previous apparatus of the kind. The particles on the feed belt move nearly as quickly as the peripheral speed of the separating discs and are therefore almost stationary between the two instead of being carried quickly across a short magnetic zone. As the peripheral speed of the discs is slightly faster than the feed belt, immediately the "magnetics" are lifted from the belt they are carried away and dropped (*i.e.*, the discs do not endeavour to pick up more and more as was the case with previous designs). Except when ores of different magnetic permeabilities have to be extracted from one feed it is not necessary to have more than one disc, as the magnetic particles have to travel along the magnetic zones instead of across it.

The wet type electro-magnetic separator for the treatment of vitreous enamel, glaze, paper pulp, &c., separates iron from potters' slip. The "Rapid-Biaflux" electro-magnetic drum (illus.) is shown arranged with a jig shaker feeder which can be fed by a belt-bucket elevator. This drum is particularly suitable for the treatment of foundry sands. There is a magnetic pulley that eliminates "neutral spots" and also a magnetic belt which can be applied to magnetic pulleys and increases their efficiency.

All the electrical windings of oscillating chute magnets are not under mechanical stresses; they remain stationary, being supported on a fabricated channel section framework. Above these units a tray fitted with the magnet bars is vibrated endwise by motor drive. This new design reduces the working parts, saves a very considerable amount of structural framework, requires little power to drive it, and occupies less floor space.

A "Circular" lifting magnet operated by an electric hoist, various types of magnetic chucks, clutches and chute separators and scrap-iron sorting magnets are other exhibits

Rawlplug Co., Ltd.

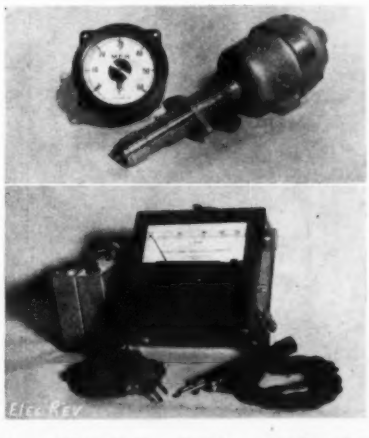
Available in a wide range of sizes, the new "Rawl" fixing bolt exhibited can be used for a variety of purposes, from the fixing of small signs to the holding down of machinery weighing many tons. "Rawlplugs" are to be demonstrated, as is also the "Rawlplug" mechanical hammer, with which builders and members of kindred trades are familiar.

Such commodities as the "Durofix" heat and waterproof adhesive, plastic wood, and similar products, are exhibited, together with the latest addition to the range, which is plastic metal for making good defects in metal work. This can be used with success by the amateur.

Record Electrical Co., Ltd.

Improved "Cirscale" pattern wattmeters, power factor meters, and frequency meters of switchboard and portable types are exhibited. In a range of test sets for insulation and resistance measurements is a continuity tester having a true ohmmeter movement, independent of voltage variations, and with a self-contained battery in a strong teak case. The terminals, like those fitted to the "Minor" insulation tester, are of the screw type and will take any convenient size of connecting leads; the scale is marked from 0-5 ohms. There is a four-range milli-ohmmeter for desk use reading down to 0-001 ohm for resistance such as aircraft frames, bus-bars, and switch contacts.

The "Cirscale" electric tachometers for aircraft, marine, and industrial uses which are also displayed employ a 300-deg. scale, while for railways, electric



A "Cirscale" electric speedometer (above) and a change-coil, desk-type, multi-range milli-ohmmeter (Record Electrical Co.)

trolley-buses, and motor vehicles there is an electric speedometer (illus.). At low speeds the indicator pointer is steady, due partly to the elimination of the flexible drive; there is no "time lag" on accelerating and the readings are "dead beat." The transmitter can be supplied with an adaptor for fitting to the gear box, or any convenient position on the vehicle.

A portable precision electric tachometer with finely divided scale and mirrored dial, complete with lightweight d.c. generator, can be provided with single or multi-ranges reading 0-500, 0-2,500, 0-5,000 r.p.m.

In the portable series the chief item is the multi-range change-scale a.c. and d.c. test set (illus.). An ingenious method of changing the coils enables accurate readings to be taken from 0.1 up to 600 A and 6 to 750 V. No weighty accessories, such as shunts and transformers, are necessary. Current transformers, cut-in and cut-out switches, and a.c. and d.c. circuit-breakers are shown.

Revo Electric Co., Ltd.

This stand is sectionalised for the display of such domestic appliances as cookers, water heaters, fires, and fans;

The Revo "Jubilee" model cooker

also switch- and fuse-gear, street lighting equipment, reflectors, watertight fittings, traffic signals, road signs, &c.

Besides the "Domestic," "Economy," "Family," R.10, R.30, R.40, and R.50 cookers, there is a new R.14, R.34 and and R.44 series, while the miniature "Jubilee" model (illus.) measures 16 in. high, 15.25 in. wide, and 14.25 in. deep, and is designed for those houses and flats in which the large cabinet models cannot be conveniently accommodated.

In the outdoor "Quarry to Road" section of the Fair a portion of the specimen roadway will be illuminated with "Revo" street lighting equipment. The "Magnalite" patented directional street lighting fitting, which is suitable for use with a 90-W sodium vapour lamp, consists of a metal frame with specially designed one-piece faceted silvered mirrors. It is suitable for either side or centre of road mounting and is designed to accommodate the necessary control gear in the chimney, being weatherproof. Each fitting is provided with a vacuum glass to protect the lamp and is 2 ft. high and 1 ft. 3 in. wide, including the joint box.

Rheostatic Co., Ltd.

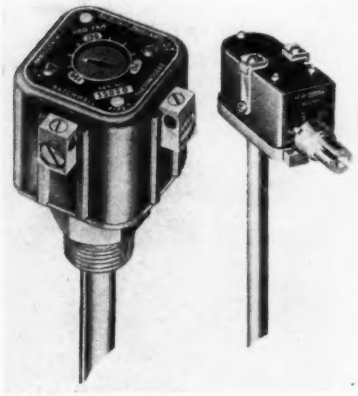
The "Satchwell" Type "CS" cooker thermostat (illus.) for oven temperature control is rated at 15 A a.c. The temperature adjusting knob is calibrated over the complete cooking range and also has a definite "off" position so that no separate oven switch of any sort is required.

The "Q" room thermostat provides exceedingly close temperature control, namely, plus or minus ½ deg. F., which is an advance in direct acting all-metallic thermostats. The instrument is rated at 15 A a.c. and can be used both for the switching of electric heating loads and for the direct starting and stopping of small motors used in heating and ventilating installations.

Among immersion thermostats shown are the "Z" and the "Y," which is of similar construction to the former and has recently been introduced for use in the smaller sizes of electric water heaters; its capacity is 6 A a.c.

The "CB" control box for automatic coal stoker installations is shown. It

contains a mains switch and fuses and a motor starting relay with overload and no-volt protection. There is also the "SS" stoker switch, which is an intermittent firing device for automatic coal stokers, or coal blowers, and its main function is to keep the fire alight during the periods when the controlling thermostats are not requiring heat. When the stoker is shut down by the operation of one of the controlling thermostats and the fire gradually dies down, the lower flue temperature will cause the stoker switch to restart the stoker motor for a short period until the fire has been revived, and then it will switch off and allow the fire to smoulder again; it will repeat this process indefinitely. The stoker switch will also shut down the plant completely should the fire go out through an accident, thus preventing the combustion space being filled with green



"Satchwell" type "Z" immersion and "C.S." cooker thermostats (Rheostatic Co., Ltd.)

fuel, while it will shut the plant down temporarily should an exceedingly high flue temperature be reached.

Robbins & Bradley, Ltd.

Three new chromium-plated lighting fixtures are two- and three-lamp fittings with tinted glass cylinders and a totally encased two-lamp fitting (illus.), also with tinted glass cylinders. These fittings are supplied wired complete ready for fixing.

Rotax, Ltd.

This company's stand will contain examples of electric drills, polishers, sanders and grinders, oxide cathode and mercury-arc rectifiers, battery charging rectifiers, garage and aircraft electrical equipment, train lighting, rotary converters, &c.

Ruston & Hornsby, Ltd.

The horizontal "Thermax" boiler exhibited is used where headroom is an important consideration, and the vertical "Thermax" where floor space is very limited and head room is ample. Special features of the boiler are a wet-back combustion chamber and two sets of fire tubes. The products of combustion pass through the flue to the combustion chamber, thence through one bank of tubes to the smoke-box at the front, returning to a chamber at the rear through another set of tubes. This second set is divided into two nests, arranged on either side of the wet-back combustion chamber, and at the same level as the first set of tubes. This arrangement avoids taking the final pass, at which the gases are at their coolest, through the top part of the boiler where the water is at its highest temperature.

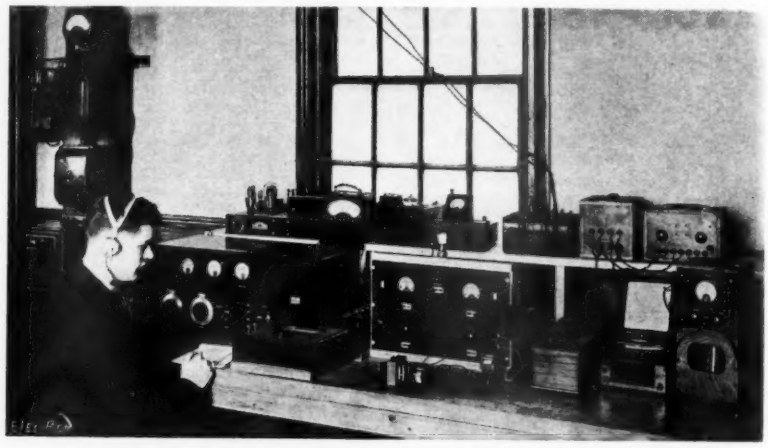
Holes are provided in the smoke box for every four tubes. Through these the tubes can be cleaned while the boiler is under steam, thus saving a considerable amount of time.

The horizontal "Thermax" boiler is offered in sizes from 1,000 lb. evaporation upwards. Its overall dimensions are small, thus saving floor space. Moreover, it is entirely self-contained and no brick setting is required. Automatic stokers can be fitted for burning low-grade coal, and the boiler can be equipped with any recognised make of oil burner.

An associated company, Ruston-Bucyrus, Ltd., shows two Diesel locomotives working on a 2-ft. gauge track drawing tubs which are being filled with earth from a trench dug by a Ruston-Bucyrus excavator, while a power driven diaphragm pump empties water from the trench.

Joseph Sankey & Sons, Ltd.

This exhibit includes examples of electrical stampings, such as the company has been supplying to the electrical trade for nearly fifty years, for dynamos, transformers and other machinery and apparatus. During this long period numerous special tools have been introduced for producing stampings of almost any shape in a few days. We illustrate part of the company's test-room, some of the instruments appearing in which can be seen on the stand at Birmingham.



Part of Joseph Sankey & Sons' testing room

George H. Scholes & Co., Ltd.

The "Wylex" system provides complete interchangeability of plug outlets throughout the installation. Two three-pin (flat) plugs can be used simultaneously in one socket. The 5-A fuse-plug fits direct into the 15-A socket without an adaptor, but the 5-A socket will accommodate only a 5-A plug. The "Wylexion" two-pin B.S.S. plug and socket can be used without a switch on a.c. circuits. A shutter covers the apertures to guard against accidental contact, there is no overhang, and the pins cannot close beyond the parallel. The contacts are self-adjusting, a cord grip is provided, and a convenient feature is the large hollow back of the socket (with normal projection) which makes wiring easier and avoids the need for a surface pattress.

Besides a fused plug for clocks other accessories are ceiling roses, joint boxes for c.t.s. and lead-covered cables; a two-piece gland that is watertight and provides good bonding; a small plug and socket that enables pendant lighting fittings to be removed easily for cleaning; and the "Quix" device for easily attaching switches to the wooden door jamb instead of plugging the wall.

Philip Schulman, Ltd.

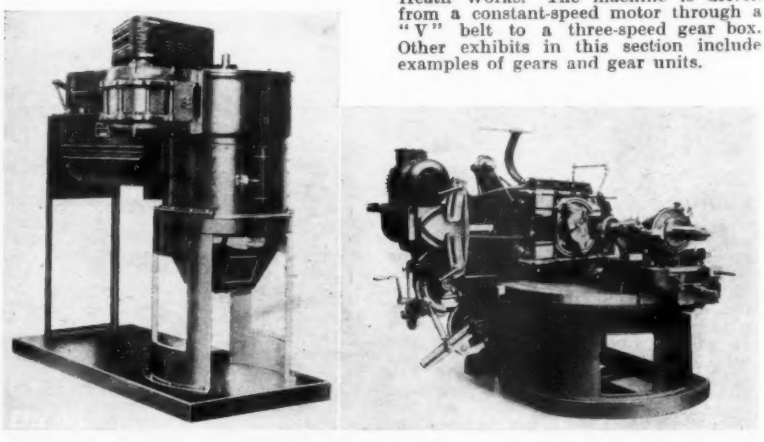
A number of novel electric lighting fittings and advertising window display clocks are features of this exhibit.

H. Simon, Ltd.

Several new machines and appliances are being shown for the first time on this stand, at which the subsidiary, Turbine Gears, Ltd., is also represented. One is the "Californian" press (illus.), which has been developed for the purpose of converting meals, feeds and balanced rations into cubes and pellets for feeding chickens, cattle and other livestock, but it can be used for other materials and chemicals. Another interesting working exhibit comprises an interconnected assembly of weighing, feeding, discharging, regulating and indicating appliances for grain and other materials. This group includes an electrically controlled automatic weigher, any number of which can be synchronised for proportioning materials by weight. An electrically operated unit for starting and stopping machines from remote positions, automatic bin regulators for controlling deliveries of materials, a presetting stop counter for automatically switching off after any predetermined number of operations, and other similar control devices are incorporated.

The latest type of "Impact" grinder with the electric motor built into the frame of the machine is on view. An important improvement gives a reduction in noise. Exhibits of soap-making machinery include a three-roller soap-milling machine and a soap plodder for the compression of soap ribbons into solid bars.

On the section of the stand devoted to the products of Turbine Gears, Ltd., a Smith & Coventry type spiral bevel gear generator (illus.) is in operation. These machines are now being manufactured by Turbine Gears, Ltd., at Cheadle Heath Works. The machine is driven from a constant-speed motor through a "V" belt to a three-speed gear box. Other exhibits in this section include examples of gears and gear units.



The "Californian" motor-driven press (left) and a spiral bevel gear generator constructed by Turbine Gears, Ltd.

Simplex Electric Co., Ltd.

This company and its associated factories demonstrates the latest developments in the steel conduit system of electric wiring, many new accessories having been introduced. Industrial lighting equipment in great variety includes fittings for all types of factories, and the recently introduced range of "Simplex" flameproof lighting equipment specially designed for underground colliery work and for industrial use in situations where inflammable vapours are prevalent.

The new "Creda" electric cookers have plug-in boiling plates and boiler-grillers, the latter employing a rustless metal deflector when boiling only. Other features of this type of cooker are a large grill chamber with a one-piece spring-loaded door, a large steam-tight welded oven free of any electrical parts and producing an even heat distribution at all temperatures; a semi-sunk oven door with minimum projection; a self-acting latch enabling the door to be tightly closed even when both hands are engaged; an improved thermometer totally enclosed for protection on the inner side of door; built-in switches; easy access from the side of cooker to oven elements and wiring; rounded corners, and clear smooth surfaces for cleanliness; and oven body and door packed with heat-retaining material.

There are also water heaters, fires, wash-boilers, tubular heaters and other domestic appliances. The latest addition to the company's activities is shown in the exhibit of "Mersey" cables.

Henry R. Soutter, Ltd.

Electric irons, kettles, toasters, and medical sterilisers will be shown here.

I. & M. Steiner, Ltd.

This company is showing electric fires, lamps, and adaptors.

Stewarts & Lloyds, Ltd..

Indoors there are water and steam tubes and fittings, welded and weldless tubes with joints for gases and liquids, and also steam mains for use at high temperatures and pressures. Forge, foundry, and special pig irons and steel castings are represented as well.

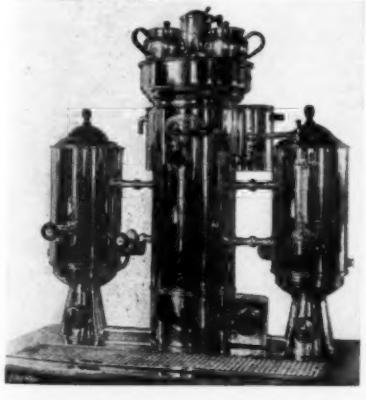
On the outdoor stand are large-diameter tubes, examples of tubular fabricated products, and all-steel electric lamp poles. These "Reservoir" standards are devoid of castings entirely; the ornamental bases are made of steel tubes, the finials are made of the tubes themselves, and even the ornamental collars, when provided, are made of steel.

Stokes Appliances, Ltd.

Besides the well-known electric table cooker, this company will be displaying electric soldering irons and electric heating elements for all purposes.

James Stott & Co. (Engineers), Ltd.

Rapid water boilers for the catering trade are made for an output of from



A James Stott water boiler with urn at each side

4 pints per minute, based on a loading of 5.5 kW and with elements arranged for single-, two-, or three-phase connection. An automatic switch interlocked with the draw-off tap, or a bain-marie top can be fitted if desired. Similar 6.9-kW café sets (illus.) consist of a central water boiler with a gallon urn on each side for milk heating and coffee making, each urn being fitted with independent immersers so that it can be used without the boiler and can also be heated by water circulation.

Hotel hot-cupboards are made of steel plate with a polished cast-iron top. The elements are at the bottom below the shelves and are controlled by a three-heat switch. If the top is to be used as a carving table it can be fitted with any combination of carving wells, sauce and gravy dishes, and bains-marie. The loadings are 2,400, 3,200 and 3,500 W.

Automatic food and vegetable steamers are made with from 5 to 10 internal wire baskets and loadings of from 4.5 to 16 kW. They are heated by immersion blades thermostatically controlled. Automatic water supply is provided by a ball tap cistern attached to the side of the steamer, the door of which is cam locked.

Sunderland Forge & Engineering Co., Ltd.

An electric welding set (illus.) comprises a drooping characteristic, self-excited d.c. generator driven by an electric motor and mounted as a combined portable unit. The set exhibited has an output variable between 40 and 300 A at 25/30 V for metallic arc welding and is provided with a finely graduated portable regulator. The motor is suitable for 440-V, 3-phase, 50-cycle supply, and the machine is robust, light and compact, mica insulated and drip-proof and can be supplied with either d.c. or a.c. motor. If desired the generator can be arranged for belt or petrol engine drive.

High-speed vibrating screens of welded construction operate on the simple principle of the loosening and stratifying of the material to be screened by imparting a series of rapid vibrations to it at right angles as it travels over a woven wire or punched plate-screening surface. The mechanical vibrator is driven by a 1½ h.p. "Sunderland" motor specially designed to withstand vibration.

By the operation of a handwheel the intensity of vibration may be varied while the machine is operating. This adjustment, together with simple control of the inclination of the screen, enables precise treatment of the material to be obtained.

Switchgear & Cowans, Ltd.

Internal isolation switchgear of 250,000 kVA rupturing capacity is partly sectionalised to show the construction of the Whitehead system of internal isolation; the circuit-breaker remains permanently on the floor and isolation is achieved by the simple movement of contacts within the breaker.

A further example is a 100,000-kVA unit, together with two isolators for ring-main service. Non-automatic switches are of two types, namely, a fixed one in which access is obtained by lowering the oil tank; and one slightly more elaborate in which the complete switch may be isolated by being dropped down and drawn forward for inspection.

A new ring main unit exhibited consists of two isolators and a switch-fuse mounted in a common oil tank. The two outer units which control the ring main are in the form of isolators without any protection, while the middle unit is an oil switch-fuse.

This three-way equipment is suitable for 11,000-V service, while the contacts of both the isolators and the switch-fuse units are rated at 300 A. Quick make-and-break mechanism is incorporated and the equipment is completely watertight and may be used below ground in damp situations.

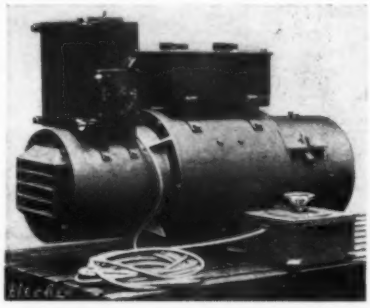
Mining type oil-immersed, draw-out, gate-end switchgear; airbreak, draw-out, gate-end starters; a fuse-switch trans-

A totally enclosed lighting fitting (Robbins & Bradley, Ltd.), a combined lighting fitting and clock (Walker Fender Co.), and anodised aluminium table standard (Fitz-Gibbon & Murray, Ltd.)

former colliery lighting unit; and plugs and sockets, flit-plugs and cable couplers are other items.

Tangyes, Ltd.

Apart from boiler feed pumps there are others of the vertical three-throw hydraulic pressure, turbine, centrifugal, horizontal treble-ram, vertical treble- and single-ram, and buck and plunger types. Also car washing equipment, air



Welding set made by the Sunderland Forge & Engineering Co.

compressors, a hydraulic sleeving press, jacks and lifting tackle.

The Telegraph Construction and Maintenance Co., Ltd.

Among the cable exhibits are gutta-percha insulated submarine types, including a specimen of multicore telephone cable insulated with "K-gutta" and sheathed with "Telconax"; a range of specimens of paper-insulated mains cables of all types and sizes for working voltages up to 11 kV, together with joint boxes and accessories; and standard types of cable for broadcast relay services. There are also examples of the application of magnetic alloys ("Mumetal," "Radiometal," "2129 Alloy" and "Rhometal") for instrument transformers, sensitive relays, magnetic shielding, radio and television. Samples of sheet, strip and wire are shown, together with heat-resisting alloys, rod, strip, sheet, and wire for electrical furnace parts, radiators, &c., and degasified alloys for vacuum electrodes and glass sealing. The gutta-percha moulded goods include joints, packings, acid containers, bottles, carboys, measures, cutting blocks, tissue, bosses, dental stick and sheet, while among the general exhibits there are samples of conductors, compounds and insulating tapes.

Herbert Terry & Sons, Ltd.

The adjustable "Anglepoise" lamp bracket is supplied complete with re-

flector, push-bar switch and plug-adaptor. The jointed arms are spring-balanced so that control of position does not depend on friction, clamps, or flynuts. It is available as a table standard, wall bracket and a portable floor standard on smooth-running castors.

Other items are springs, presswork, wirework, fan belting, wire cutters, flexible shaft outfits, tools and accessories.

T.M.C.-Harwell (Sales), Ltd.

This company and three associated concerns for the manufactures of which it holds sole selling rights show a wide range of moulded electrical accessories made by P. H. British Electrical Works, Ltd. The new "Ezilite" bed-switch conversion set consists of a special two-way tumbler switch and a snap pear switch connected by a length of flexible cord. It enables a bedroom light to be operated either from the tumbler switch by the door or from the pear switch suspended at the head of the bed.

On another part of the stand is a selection of "T.M.C.-Hydra" paper condensers for radio and general purposes and such other products of the Telephone Manufacturing Co., Ltd., as intercommunicating telephones, a new microphone for public address and radio work to be marketed under the name "Vari-Dep" and a selection of "Temco" a.c. mains-operated clocks. There are also bells, indicators, bell transformers, switches and bell pushes made by the Agro Electrical Co., Ltd., as well as specimens of moulded lampholders, pocket torches and "Agro" bakelite switch blocks.

Tok Switches, Ltd.

In this selection of switches for cooking, heating, and lighting requirements is the "Kubic" cooker model which is designed to allow any number of switches to be mounted in line close together. There are also reciprocating switches, housed in bakelite covers with porcelain pointers; a wide range of non-reciprocating two- and three-circuit types housed in metal covers, switches with bakelite keys; the 600-V "Barrier" type, and single- and double-pole types.

The Tok four-heat switches shown are specially designed for the more accurate control of heat in electric cookers, while there are specimens of rotary snap switches of sound construction.

Turbine Furnace Co., Ltd.

A "Turbine" furnace, as arranged for a Cornish boiler, is shown complete with fan-forced draught, and it should be noted that the equipment includes the latest "extension" grate of both the solid metal and refractory filled types. A standard arrangement of forced draught with auxiliary steam jet will be shown with the fan running to demonstrate the even distribution of air over the firegrate.

In the company's new "Turven" equipment especially designed for the burning of small fuels such as anthracite grains, the air spaces of the special firebars can be varied so that the grate can be used for large coke. All types of boilers can be fitted with this new equipment, which is claimed to be easy to install and low in first cost.

Venner Time Switches, Ltd.

For its first appearance at the Fair this company is exhibiting standard types of switches for street and shop window lighting and the more specialised uses. These can be electrically wound (a.c. and d.c.) with three days' spring storage, 8-, 15- and 35-day hand wound, synchronous motor driven, or synchronously driven with 60 hours' spring storage. The last type represents a new addition to the range of clocks, the feature being that although synchronously driven the clock is actually maintained by the spring storage, but is automatically corrected every 62.5 minutes. Thus accurate timekeeping is maintained, even in the event of a failure of the supply.

Prepayment meters include those for electric radiator use in hotel bedrooms and for collecting a fixed weekly standing charge. From two-part tariff prepayment meters that embody a fixed standing charge a more recent departure allows for a variable charge from 3d. to 8s. per week to be easily set from outside the case. They can also be fitted with a device which enables the charge per kWh to be varied from one price to another according to the season.

Examples of special apparatus are the direction-finding watch compass, electrically operated stop watch, Marconi switch and coder for direction-finding wireless lighthouses, tramcar recorder and master frequency control clock. An addition to the relays is one for use in telephone kiosks for controlling the lighting of the kiosk over the telephone lines. Showcases display a number of products in various stages of assembly and the turnings and pressings produced at the works.

Waite & Son, Ltd.

A recently designed floor lamp standard has an oval chromium stem with a base of Caucasian walnut and Swedish birch veneer, and a 20-in. oval "Waitelite" shade. Another has a rectangular

A bedside lamp (Waite & Son, Ltd.)

chromium stem with a coloured walnut base and a 22-in. drum shade. A 12½-in. table standard incorporates a chromium stem terminating in a glass ball resting on a walnut base, while a block-like table lamp is available in pastel colours and chromium with an angular embossed shade. A chromium bed-side lamp (illus.) is provided with a glass shade in rose, green or cream.

Walker Fender Co., Ltd.

In this display of table lamp standards of a variety of styles and sizes there is one model (illus.) with an inverted "U" stem between the limbs of which an electric clock is mounted. There is also a plain reading or desk lamp with an adjustable telescopic stem.

Walsall Conduits, Ltd.

Among these exhibits there are conduits of every description with special finishes and varied types of fittings; switch boxes from a single switch-way to fifty-ways; single and multi-way switch plugs; domestic and industrial switch plugs; fuse boards and house cut-outs; switch-fuse boards and industrial lighting equipment; reflectors of special design; patent grip continuity fittings and metal-sheathed wiring systems; hospital fittings, including "Sparkless" mercury switches for operating theatres; flameproof systems; high-voltage switch and plug gear; and control switches for neon lighting. The latest additions are electric fires in a wide range of sizes and artistic finishes, and a tubular heater of new design.

Westinghouse Brake & Signal Co., Ltd.

Metal rectifiers have recently been developed considerably for industrial applications. For electro-deposition plant rectifiers have been supplied with outputs of from 500 to 3,500 A at from 6 to 12 V (illus.), while an outfit of a total capacity of 29,000 A is under consideration. The largest so far installed is in the plating shop of Morris Motors, Ltd., its output being 3,500 A at 8 V.

A 1,000-A plating equipment demonstrated has its transformer mounted separately from the rectifier, which is fan cooled, thus reducing the number of rectifying units used for a given output and consequently the size of the plant.

The most popular size of charging plant for electric vehicle batteries is one capable of dealing with 30 cells at 20/10 A. These charges are entirely automatic, the vehicle driver having only to connect a three-pin plug to the vehicle to commence charging. Chargers of this type are made singly or in units for 3, 6 and 12 vehicles, and the largest set so far supplied is one of 44-kW capacity, consisting of six 2-circuit sets for charging 44-cell batteries at 40/20 A.

So far as high voltages are concerned, in addition to those already built for electrostatic precipitation, there is a rapidly increasing demand for sets for X-ray work, deep therapy, cable testing and general laboratory purposes, for which sets up to 400 kV have already been built. A high voltage rectifier for electrostatic precipitation is to be seen on the stand.

Whitecross Co., Ltd.

In addition to cold-rolled strip and fencing wire, "Silflex" galvanised wire is made for telegraph and telephone lines, while a show case illustrates the evolution of a wire rope from the bloom to the finished product. Novelty is introduced in the form of a working replica of a trolley, the object of which is to direct attention to the company's non-ferrous wire products, such as copper, cadmium copper, aluminium, and bronze, of which trolley wire is one example. "Armco" rust-resisting ingot iron, 99.9 per cent. pure, is made for conductors, cable-armouring and welding.

Henry Wiggin & Co., Ltd.

The full range of the company's products is represented, including electrical resistance alloys, monel metal, "Inconel" and malleable nickel.

Wilkins & Wright, Ltd.

The accessories displayed on this stand include such electrical fittings as chains, ceiling plates, galleries, switch plates, canopies, lamp standards, spherical glassware fittings, enclosed bowl fittings, various electric ceiling fittings, shade carriers and reflectors, the latest lines including accessories with aluminium and anodised finishes.

S. Wolf & Co., Ltd.

Besides the well-known range of portable electric drilling machines from ¼ in. to 1 in. capacity, there are bench drill stands, bench and pedestal tool-grinding machines, and also portable and lathe grinders. Other popular tools are portable electric blowers, screwdrivers, nut setters and hammers. Flexible shaft grinding, filing and polishing machines and garage kits and super-engine kits will also be prominently exhibited, and a special new attraction is the "Wolf Cub" light-duty ¼-in. electric drilling machine. All models are demonstrated on the stand and offered on seven days' free trial.

E.D.A.'s Guide to the Fair

Following its usual practice, the British Electrical Development Association has prepared a guide for the convenience of electrical visitors to Castle Bromwich. This contains a plan of the whole of the buildings which gives the numbers of the stands and indicates the principal offices, buffets, restaurants, &c.

The electrical exhibits are classified under about ninety headings giving the names of the companies and their stand numbers. This is an indication of the comprehensive nature of the electrical industry's display.

Electrical men and women will be welcomed at the E.D.A. rest lounge at which members of the Association's staff will be in attendance to act as "guides, philosophers and friends," and to answer requests for information regarding the Association's activities in general and relating to the exhibits in the Electrical Section.

1,000-A, 6-V, fan-cooled Westinghouse metal rectifier for plating

Jubilee Illuminations in London and the Provinces

1. A Worcester night scene, showing the Cathedral, St. Andrew's Church, and the Severn Bridge. 2. Tower Bridge (Siemens). 3. Ruthin Castle (Ruthin E.S. Co.). 4. Clapton Square, London (B.T.H.). 5. St. Albans Town Hall (Holophane). 6. The Library, Ashburton Park, Croydon (Electricity Department). 7. Metropolitan Water Board Offices, Rosebery Avenue, E.C. (G.E.C.). 8. The Council House, Birmingham (Electric Supply Department).

The N.P.L.'s Activities

THE scope of the National Physical Laboratory continues to extend and no fewer than 260 pages are required for its annual report for 1934, which has just been published (H.M. Stationery Office, 12s.).

In the Electrical Department the laboratory has constructed some new resistance standards, which have been designed to secure the maximum possible degree of permanence. A new formula has been developed for calculating the eddy-current losses in large conductors and its accuracy has been proved experimentally. For the measurement of high voltages a sphere gap voltmeter, incorporating spheres of 50 cm. diameter has been constructed, and the characteristics of the impulse generator have been further studied by means of the cathode ray oscillograph.

Among the activities of the Electrotechnics Division is the calibration of sets of instruments used for determination of the efficiency of large turbo-alternators during their acceptance tests. The development in the use of discharge tubes of the mercury or sodium type especially in street lighting, has brought up the problem of heterochromatic photometry in a very acute form. The whole subject is one of great difficulty and has been the subject of much active investigation.

The new photovoltaic cells, which require no battery, but act simply by the conversion of light energy into electrical energy, are now coming more and more into prominence. Their characteristics have been studied and cells have been produced at the laboratory which have a sensitivity independent of the angle at which the light strikes the surface of the cell. Two modifications have been made in the "glaremeter," an instrument used for measuring the degree of glare in a given system of light.

Tests have been made with the object of determining whether the colouring of the beam of a motor car headlamp enables the driver to see objects at a greater distance in foggy weather. The colours tested were red, light orange, dark orange and blue green, and it was found that the revealing power was the same as that for a white beam of the same intensity.

Radio Research

In the Radio Department investigations have been carried out into the electrical properties of the soil and of the ionosphere. The practical problems of direction finding are closely connected with the vagaries of the waves returned from the ionosphere, and the most novel apparatus proposed employs the principal of the cathode-ray direction finder, four loop-aerials being used at the corners of the square, with all four loops having their planes parallel to one another.

The behaviour of inductance coils subjected to measured temperature charges is also dealt with, and an automatic monitor system, which brings back the tuning of the transmitter from any drift away from that of a [illegible]ontrol oscillator, has been devised and tested.

Among the measurements of the electric[illegible]ties of soils, which have been carried out both by laboratory and by field methods, special interest is attached to the measurement of these properties in a large body of fresh water, by utilising the ice-sheet covering it in winter conditions to support the measuring apparatus.

The testing of loudspeakers is carried out by the Physics Department on the flat roof of a building 70 ft. high so as to avoid disturbance from neighbouring objects. In connection with the Physics Department a new acoustical laboratory has been constructed with experimental rooms isolated both acoustically and electrically, and such that regular standing-wave patterns cannot be set up in them.

With the object of enabling all laboratories interested in colour measurement to adopt the N.P.L. system of colorimetry without the need for the purchase of an expensive instrument, a simple colorimeter has been designed. Incidentally, the N.P.L. system has recently received international adoption.

Fatigue Under Combined Stresses

The new combined-stress fatigue-testing machines have been continuously employed on a comprehensive investigation of the strength of metals under combined alternating stresses, the main objects of the work being the determination of the stress criterion which produces failure, and the provision of design data for such engineering components as engine crankshafts. The mechanical properties of materials at high temperatures continues to be investigated, as well as the strength and causes of failure of lifting gear components.

Nearly two thousand complete mechanical tests on welds are being made, and the results should permit an authoritative pronouncement to be made on the use of electric welding in the erection of steel structures in this country.

The preparation of pure iron and also magnesium alloys has been occupying the attention of the Metallurgy Department.

Avoiding Delivery Delays. By "Designer"

IN these days the purchaser of electrical machinery wants his goods "off the shelves"; he may order his heavier machinery months ahead, but in many cases the driving unit is apt to be left until about two weeks before the plant is due to start up, when hasty inquiries are sent out to electrical manufacturers asking for delivery of the material within ten days at the latest. Should the machine be a standard one or for a standard voltage a good manufacturer can usually supply it from stock, but if there is a special shaft, special fixing centres, or height of centres, extra work is entailed in the shops and the works routine programme is upset.

Orders for machines go to the company which quotes the shortest delivery date, all other things being equal. If the manufacturer is late in completing delivery the purchaser takes his order elsewhere next time, but to a great extent the buyer has himself to blame as manufacturers have to quote deliveries which they know are absurd to obtain the business, and, as stated above, the customer sometimes leaves the matter until the last moment.

To speed up delivery of non-standard machines various methods can be used. Non-standard voltages are dealt with in the case of a.c. machinery by carrying unwound stators in stock and winding up for the required voltage. For d.c. machines it is preferable to stock complete machines, with or without field coils, as shown by previous similar orders, for 110, 220 and 440 V. The complete machines are of the shunt-wound type, and if compound or non-standard voltage machines are required new field coils can be fitted, enabling delivery to be made in from three to seven days.

Special shaft requirements fall into two types, namely, those which are shorter than the makers' standard or need special keyways cut, and, secondly, shaft extensions, the dimensions of which are totally different from the makers' standards. In the second case the shaft must either be withdrawn and a new shaft fitted, or, as this is sometimes impossible, where the armature is not built on a spider [illegible]plete new armature or rotor is necessitated. These requirements all mean additional delay in a shop laid out for unified work.

In a.c. machinery customers have certain fixed speeds to work to, depending on the supply frequency. In the case of d.c. machinery the purchaser may specify 800 r.p.m. and the nearest machine in the manufacturers' stock, may be 1,000 r.p.m. or 750 r.p.m. If the drive is a pulley one the manufacturer can deliver from stock by adjustment of the pulley if the customer is agreeable.

Special enclosures also mean delays and to minimise these the end brackets are of necessity interchangeable, whether of the pipe-ventilated, totally enclosed, or protected types. Non-standard centre-heights mean packing pieces on site, an alteration which manufacturers find necessary in the case of machine-tool makers with whom they have opened new accounts, and who in the past have had their machines from a supplier whose height of centres was different. If the order is the first one from the machine-tool maker invidious comparisons are made when the machine becomes overdue, and the next time machines are required the previous supplier again receives the order.

In the manufacturers' works the best method of dealing with urgent orders is to have a separate stock department, with an engineer and two draughtsmen. The orders should be passed by the stock order clerk to the engineer, who will decide whether the electrical requirements will allow of stock allocation (with or without electrical alterations). If alterations are required he should notify to the stock clerk, advising him of the details of the alteration, and the clerk, in turn, should write to the customer or branch giving the date due. The order should then be passed to the draughtsmen, who will send certified prints to the customer. The shaft particulars and feet centres are checked up, and, if the customer has no special requirements regarding these, the machine is despatched. The stock order should be typed out during the same day and the invoice sent to the customer.

If minor alterations in shaft dimensions are required the draughtsman should send schedules to the shops to have the work carried out, and the time must coincide with the delivery date given by the stock clerk. The schedule paper, being a different colour from the ordinary work schedules, enables the shop staff to recognise that the work thereon is urgent.

The requirements during the previous year usually provide an accurate estimate for stock.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Power Station Thermal Efficiencies

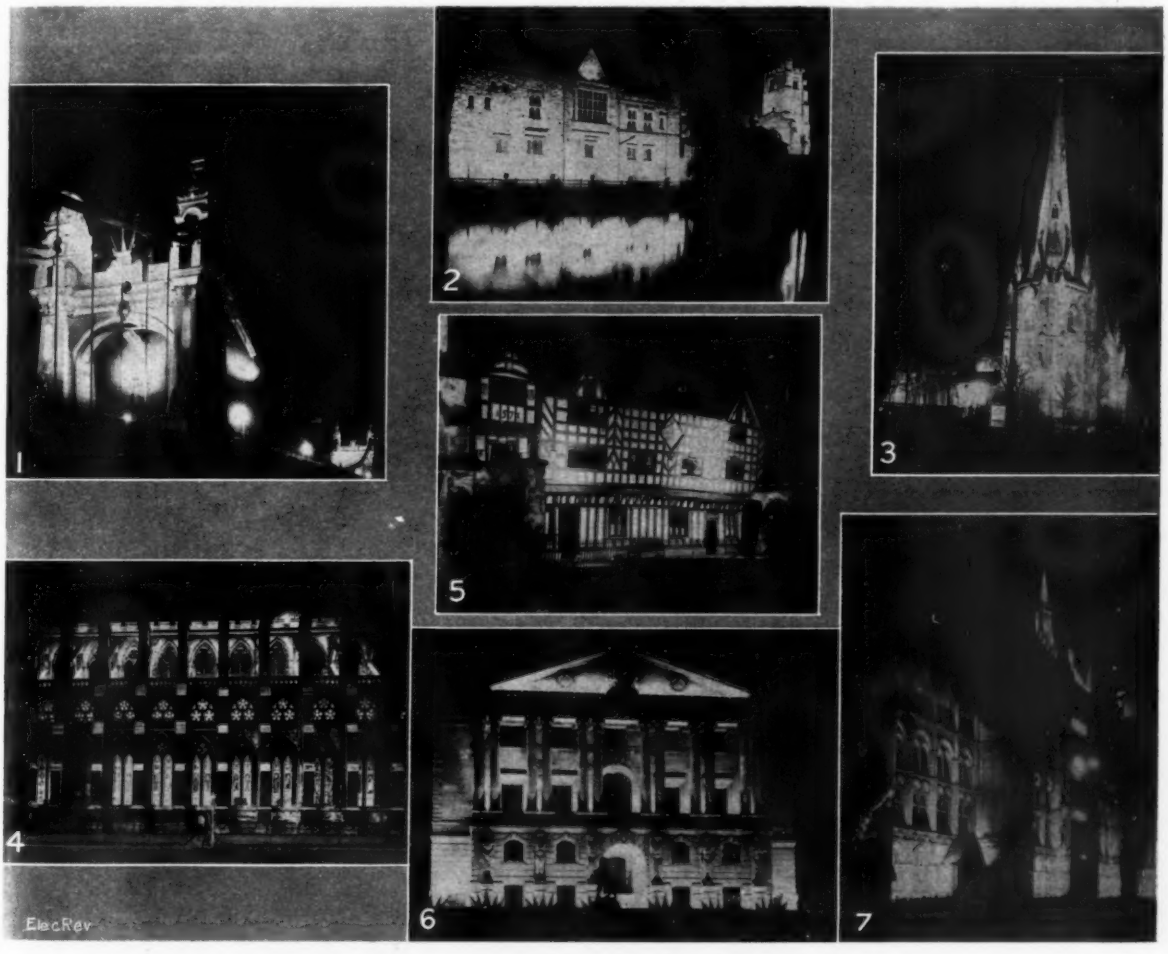
The annual report on the generation of electricity in Great Britain is interesting in so far as it shows how near the stations are keeping to their designed and guaranteed results. A new station, e.g., Battersea, is at the head of the list for coal consumption per kWh. I am sure if this were not so the engineering world in general would evince some astonishment, and naturally enquire why. As an analogy, suppose the *Queen Mary* on speed trials failed to attain the designed speed!

It is not intended to decry the efforts made by the engineering staffs attached to the generating stations in the published list, who are attaining such satisfactory results, although I am sure they realise what they are achieving is no more than the designers expected; this applies in every instance to all generating plant for thermal efficiency comparison.

Thermal efficiency is only the criterion of maintaining the highest heat transfer and efficiency of boilers, turbines, etc., to whose designed thermal efficiency cannot possibly attain to that of the modern stations, but whose actual generation costs may be comparable. Low generation costs are the obvious and ultimate attainment which is necessary for the financial success of the national grid scheme.

The publication of the generation cost per kWh would be more useful than the quotation annually of thermal efficiency and lb. of fuel per kWh tables; these are integral with the final cost figure, as an inefficient plant will be reflected in this figure, and the station graded in the list accordingly.

Questions may here be asked as to the advantage of geographical position of those stations near collieries, and consequent lower fuel freight rates. The opinion may be expressed that if the fuel cost per unit generated of a station so situated is comparable with that of a modern and larger station of high thermal efficiency not so fortunately situated, the former should be operated at a load factor that would give the fullest scope to the economic advantage of its geographical



Some Further Examples of Jubilee Floodlighting

1. Hammersmith Bridge (Siemens Elec. Lamps & Supplies). 2. Maidstone Priory (B.T.H.). 3. St. Martin's Church, Birmingham. 4. Exterior and internal floodlighting at Westminster Abbey (Holophane). 5. Lord Leycester's Hospital, Warwick (Ediswan). 6. The upper facade of the Bank of England (Siemens). 7. The Prudential Assurance Company's headquarters (G.E.C. equipment).

generate one kWh. This is relative to load factor. If the Electricity Commissioners wish a return of generating station thermal efficiencies to be comparative, a basic load factor of 50.0 per cent., or whatever average is preferred, should be given. Quoting from the published list:—Barking: The efficiency = 27.95%, L.F. = 51.7%. Longford: The efficiency = 20.02%, L.F. = 29.4%. Greenwich: The efficiency = 20.01%, L.F. = 50.3%.

If load factor was at a basic figure for these comparisons, Longford would undoubtedly be in a higher position in the table, as it is operating on a much lower load factor than Barking or than Clarence Dock, the load factor of which is 78.5%, the highest in the list.

I suggest that the Commissioners should tabulate generating station efficiency by methods which would cover those stations position. I would suggest that the annual "league" table of the Commissioners should include particulars of both the technical and economic operation, *i.e.*, the fuel cost per kWh generated based on a predetermined load factor of a fixed percentage.

GRID.

May 11th.

Cost of Hot-water Service

During a recent week-end I was able to take figures of the consumption of an immersion heater installed to replace a gas geyser which had become inefficient and worn-out due to age.

The 3-kW immersion heater, with thermostatic control, is fitted in the 25-gal. rectangular steel hot water tank of the original coal-fire heated system. This system was inefficient due to the long pipe run between the hot-water tank and the

boiler at the back of the lounge fire. The boiler had been rendered inoperative and the pipes between the boiler and hot water tank removed. The rest of the system is quite efficiently laid out; the hot-water tank is in a cupboard in the bathroom adjacent to the bath and wash-basin, the kitchen being directly under the bathroom. The hot-water tank has been lagged with granulated cork.

The figures given below are some of those taken at irregular intervals but, as the hot water demand was fairly accurately noted, interesting costs can be obtained.

Date.	Time.	kWh. consumed.	Day's consumption.	Remarks.
May 18th	11.15 p.m.			
„ 19th	9.45 a.m.	1.21		No water drawn until this time.
	4.0 p.m.	6.96		2 baths.
	11.15 p.m.	2.43	10.60	
20th	9.15 a.m.	1.63		
	10.45 a.m.	3.06		1 bath.
	12.15 p.m.	0.70		
	11.15 p.m.	3.33	8.72	
„ 21st	11.45 a.m.	5.22		1 bath.
	11.15 p.m.	2.85	8.07	
„ 22nd	11.0 a.m.	4.22		2 baths.
	1.30 p.m.	3.94		

The normal tariff of the supply company is a fixed charge together with a running cost per kWh of ½d. in summer and ¾d. in winter. A special rate of ½d. in all seasons is given for water heating for which a separate meter is installed.

The consumption between 11.15 p.m. on Thursday to 9.45 a.m. on Friday gives an indication of the losses in the installation, as no water was drawn between these times. The losses calculated from these figures work out at 2.77 kWh per day. We can, therefore, say that a hot-water service is given for 1½d. per day. A bath appears to require approximately 2 kWh, *i.e.*, it costs about 1d.

The figures given represent actual working conditions with an immersion-heater installation which, although making no claim for high efficiency, gives the owner satisfaction as a service of reasonable cost and great convenience.

Manchester, *May 13th.* REGINALD WOODS.

The Magnetic Field

Mr. Hargreaves states that my model—described in 1915, and, according to Mr. Hargreaves, anticipated by a patent of very much greater antiquity—affords proof that the formulæ e=BLV and f=BLI are incorrect, but I do not agree. Dare I suggest that Mr. Hargreaves has not fully digested the letter I wrote in 1915 describing the purpose and action of the model? I can see no other explanation of the fact that he ignores the *experimental* evidence that an e.m.f. was generated in the inner side of the coil. The essential fact arising out of experiments on the model is that although the total e.m.f. generated in the coil is zero, the formula e=BLV is still applicable to the outer conductor, as a corresponding opposing e.m.f. is established in the remainder of the coil.

So far as the inner conductor is concerned, the happenings are in line with those for the embedded conductors in an ordinary slotted armature, and so the model affords no new evidence. To raise a controversy on this point is merely to confuse the issue. If the inner conductor behaves in a similar manner to the conductors in the slots of modern armatures, in so far as generator action is concerned, it should be obvious that a similar explanation would suffice for the case of "motor" action. So that the model affords no new evidence with regard to the law f=BLI. The case of the ordinary slotted armature could equally well be quoted. In such armatures, the torque produced is very many times as great as would be deduced from the formula given above, if B were taken to be the actual flux density in the slot.

My model was scrapped before I joined the Army. But Mr. Hargreaves may think the matter is of sufficient importance to construct and test a similar model. If so, I would suggest that he constructs the coil so that it can slide freely along the rotor ring. On passing current through the coil he may then expect to obtain confirmation of the formula which he at present refutes. But it is my conviction that nothing is to be gained by experimenting on models devised, as it were, "to catch nature on the hop." It is always possible that the experimenter may find himself bowled out! In the fullness of time, the knowledge of the real happenings in a magnetic field, and of atomic physics, will no doubt be such that the points at issue will become very obvious.

It is, of course, possible that the wording of the laws may not always be sufficiently rigid. For example, the induced e.m.f. is very commonly stated to be given by "the rate of change of the flux linkages." But—shall we whisper it?—this is not always correct. The correspondence of twenty years ago upon the laws of electromagnetic induction arose out of an experiment by Blondel showing the above statement to be incorrect! He reduced the linkages from a very large value to zero without inducing e.m.f. in a circuit, by unwinding a coil wound on a magnet! A. E. CLAYTON.

Manchester, *May 8th.*

I have no intention of dealing in detail with the many misstatements made by Mr. Hargreaves in your issue of May 3rd. I did my best to show him that the failure of the machine in question to act either as a dynamo or motor could be explained satisfactorily on the principles established by Faraday and Maxwell, and that it provided no reason whatever for throwing the fundamental laws of electromagnetism overboard. I must leave your readers to decide between these authorities and Mr. Hargreaves. G. W. O. HOWE.

Glasgow, *May 7th.*

An All-electric Carillon

THE very fine toned carillon now hanging in the basilica of the new Catholic Cathedral of Christ the King in Hamilton, Ontario, Canada, was made in England.

The twenty-three bells of a total weight of 46,000 lb., including the bourdon bass in A flat, which alone weighs 9,000 lb., were cast in the Whitechapel foundry of Messrs. Mears & Stainbank, and tuned to very fine limits on the Simpson fine-tone principle.

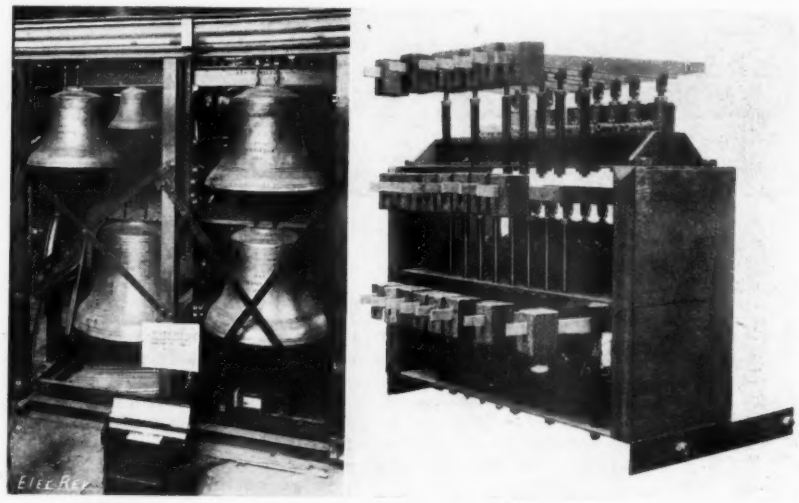
This firm also supplied the framework, fittings, and a hand clavier, or keyboard, as usually fitted for the control of carillons, whereby wooden handles take the place of ordinary keys, combined with a foot-operated pedal board coupled to the larger bells. Little effort is needed to operate this clavier, slight pressure sufficing to move the hammers of even the largest bells, which weigh over 2 cwt. each.

In addition all-electric remote control has been provided (British patent No. 26456, 1935); this is unusual because it dispenses with the use of the compressed-air gear and electro-pneumatic valves often fitted for this purpose.

Instead the rods that come down to the hand clavier are coupled to levers which, in turn, are actuated by electro-magnets. The latter are energised in the desired note-sequence by means of a circuit-making keyboard of the standard organ type. Each magnet thus pulls down its rod-lever with a smart blow action, which is transmitted through the usual hammer mechanism.

The magnet circuits are energised at 240V, which enables powerful strokes to be imparted to the bells. The contacts are so arranged that with a little practice the power of the blow can be varied, and a series of quick notes easily played. The electric player keyboard has been installed close to the normal organ keyboard to enable the organist to play the bells, and so avoid the necessity of having an expert carillonneur always in attendance.

The 9,000-lb. bass bell is mounted on ball and roller bearings so that it can be made to swing easily. The player keyboard and the electric ringing machine are the joint work of Messrs. A. E. Davies & Sons, organ builders, of West Drayton, and Macdonald, Syer & Co., Ltd., electrical engineers, 295, Gray's Inn Road, W.C.1.



The carillon and a part of its operating gear

The E.A.W. Annual Conference

Some glimpses of the future

MANCHESTER certainly did not live up to its reputation for bad weather last week during the annual conference of the Electrical Association for Women. The sun greeted the delegates when they arrived at the Midland Hotel for registration on Wednesday, and although clouds threatened on the following morning when the opening meeting was held at the Houldsworth Hall, Deansgate, they apparently changed their mind about spoiling the ladies' "spring models."

The visitors were welcomed to the first E.A.W. conference held in Manchester by the president, Lady Moir, and by the Lord Mayor of Manchester, Alderman Samuel Woollam, J.P., who said that, possessing an Electricity Department in the forefront in selling cheap electricity to its consumers, Manchester could teach the Association a great deal. Alderman William Greenwood, Mayor of Salford, also extended a warm welcome to the delegates on behalf of his townsmen.

Electricity the Liberator

Speaking of the work of the Association, Miss Caroline Haslett, the director, said that it was appropriate to remind themselves of the aims and objects of the Association. Being a women's association it was essentially a practical one, and it wanted to see women liberated from the toils and drudgery of the house by making use of the advantages of electricity. Men must not keep the secrets of electricity to themselves.

Women ought to be thankful for the advent of the machine age. Science and the machine age were going to be the greatest liberating force that had ever come to the aid of women. "To-day," Miss Haslett said, "the question is not so much 'Are you strong enough to do the work?' but 'Are you intelligent enough?' and when it comes to any exhibition of intelligence I do not think we need fear."

With the knowledge of what electricity could do towards reducing work in the house, women were determined to make as much use of it as possible. Tremendous strides had been made recently towards the general adoption of the point of view that electricity should be made available for everyone, and the E.A.W. had helped considerably by the adoption of the resolution at its annual general meeting in April last year "that the time has now come when electricity should be available, at an economic rent, to the homes of the working classes." With the object of furthering this aim an exhibition of working-class kitchens had been held, and although the work had been going on for only one year the results were very satisfactory and their efforts were to be continued.

As a result of the president's efforts they had seen the E.A.W. diploma firmly established, and engineers were realising that, after having received E.A.W. training, holders of the diplomas should be adequately remunerated. In fact, one engineer had decided to pay at the same rate as teachers.

Long ago the E.A.W. had appreciated the value of school training and made arrangements for schools to be affiliated to the Association. Manchester people would be pleased to hear that more schools had been affiliated in Lancashire than in any other county.

The time had come when women must be allowed to co-operate with builders in securing as many labour- and fatigue-saving devices as possible. As a result of a suggestion of Mrs. A. J. Newman, of Bristol, it had been decided to build the first E.A.W. all-electric house at Bristol, and members would be receiving an invitation to visit it towards the end of the summer.

The E.A.W. was by no means satisfied with its work but felt that it was getting *somewhere*. Women in Great Britain were more electrically minded than anywhere else, but this state of affairs might not always be so. Austria and New Zealand were contemplating the formation of associations, and the E.A.W. would, Miss Haslett concluded, soon be the nucleus of associations all over the world.

In reading her paper on "Domestic electrical progress in Switzerland" (a résumé of which appeared in our last issue), Mlle. Andrée Trolliet said that one of the things that impressed her most in this country was the continued use of

On Thursday last week nearly 300 of the E.A.W. members visited the historic Chetham's Hospital. At the extreme left of our top left picture is Mlle. Andrée Trolliet, the Swiss delegate. The top right photograph shows Miss Foster Jeffery, Mrs. L. H. A. Carr and Mrs. M. Hutchinson, outside the Houldsworth Hall

gas for lighting. In her country there was a horror of explosion from gas employed for this purpose.

After Mrs. Zeldenrust-De Jongh had spoken on "The E.A.W. in the Netherlands" (also reported in our last issue), a vote of thanks to the speakers was proposed by Alderman Walker, who said that of all the organisations of the electrical industry there was none more envied by their gas friends than the E.A.W. It was claimed for gas that it never let people down, but this advantage was a doubtful one if one was blown up. Gas cookers had, however, their uses—at any rate for those who had had enough of this world.

This vote of thanks was seconded by Mrs. H. C. Lamb, president of the Manchester and Salford District Branch.

Record Lunch Attendance

At the luncheon held at the Midland Hotel after the opening session no fewer than 670 persons were present. The usual toast list was dispensed with, and instead four speakers touched briefly on two of the less commonplace aspects of electricity.

Commenting on "Electricity's Contribution towards a Healthier Nation," Sir John Brooke, vice-chairman of the Electricity Commission, said that the E.A.W. was apparently so healthy that it did not need its health drunk. Smoke, Sir John declared, was inimical to health and cost Manchester alone £750,000 a year. People in this country—even their president—defended the open fire as being romantic and peculiarly English, though nowhere else in Europe was it considered anything but a nuisance. Electricity offered a solution to the smoke problem, and the sooner we realised that the latter injured public amenities the sooner it would be cleared away.

The allocation of labour and industry to the present areas was dependent on the coal supplies. With the coming of the grid and cheap electricity it was possible to put industry in garden satellite cities in any part of the country.

"The basis of all social reform is decent housing," said Dr. Elizabeth Sloan Chesser. Electricity was not so very new but during the last quarter of a century great strides had been made in its application. Doctors employed diathermy for such things as the removal of tonsils and brain tumours; static electricity for digestive troubles and neuritis; and faradism for obesity; while everyone knew of the uses of X-rays and ultra-violet rays. From this we might almost think that electricity was a panacea for every ill, "from a cold in the head to unrequited love."

Dr. Sloan Chesser gave an impressive picture of life in our grandchildren's day. She was envious, she said, of the gymnasia and all the other health aids that would be theirs. Drugs would be done away with and the doctors of the future would be as different from those of to-day as they themselves were from witch doctors and medicine men. Our grandchildren would have paper clothes and paper dishes which would be all thrown into a central electric furnace when soiled. There would be no need of the noisy and cumbersome vacuum cleaners of to-day. They would just walk round the room with a little box into which all the dust and germs would float. We must have a technique of courage, a love of mankind, and a will to peace if the new civilisation was to continue.

Scientists and Civilisation

"Science in the Promotion of Human Happiness" was the theme of a short discussion by the Dowager Lady Swaythling and Professor W. L. Bragg, of Manchester University. In electrical invention, said Lady Swaythling, there was much for which we had reason to be thankful, and the realisation of this had been brought home to her strongly while on her recent visit to the Antipodes during which the long-distance telephone to Japan was inaugurated.

Professor Bragg said that scientists were getting a number of hard knocks lately, and it was being felt "that this science business was being rather overdone." Scientists were held responsible for the horrors of war and were pictured as being completely heartless and soulless. Occasionally, however, nice things were said about them in connection with such matters as wireless and the relief of pain.

At the present time mankind was in the middle of the greatest time in history, and it was difficult to gauge the rate at which we were going. It was only by looking at some landmark in time that we could realise what had happened. People in years to come would look back and wonder how it felt to live in this generation. The cause of the great change was not that a race of supermen had appeared but that during the last few years a sort of barrier had burst and, by looking at Nature in a new way, men had found a new outlet for forces.

It was therefore important for men to understand these new powers and forces, of which the greatest, electricity, had been hidden so jealously by Nature. He would like to see electrical societies for certain classes of people to which it would be obligatory for them to belong.

After luncheon the delegates divided up into parties to visit the New Central Library, Rylands Library and Chetham's Hospital and Bluecoat School. A very happy evening was spent at the civic reception given by the Lord Mayor and Corporation at the Town Hall.

At the annual general meeting on Friday Lady Moir announced that an invitation to hold the 1937 conference at Bristol had been accepted. Votes of thanks were passed to the Manchester Branch of the Association, the Lord Mayor and members of the Corporation and other bodies and individuals who had helped to make the conference a success. Presentations were also made to the retiring officers, Lady Moir and Mrs. G. Z. de Ferranti.

The names of the officers of the Association for 1935-36 were given in our last issue. Members of the Executive Committee were re-elected and the following two additional nominations were approved: Mrs. A. J. Newman, of Bristol, and Mrs. Beatrice Swire, of London. Having secured the highest number of new members for the third year in succession (126), Mrs. M. Hutchinson, of Farnworth, has won the President's Membership Cup outright.

Works Visit

When the annual general meeting was concluded buses were waiting outside the Houldsworth Hall ready to take the five hundred or so delegates to the works of Messrs. Ferranti, Ltd., at Moston. Welcoming the company's guests at luncheon, Mr. V. Z. de Ferranti referred particularly to the "Jubilee house warming" of the new radio works at Moston, where production is now well into its stride. Councillor Miss Walters, of Worthing, spoke on behalf of the visitors and paid glowing tribute to the encouragement and help which the E.A.W. has always received from the Ferranti family and the company.

After lunch the party was conducted round the radio works in groups of about fifty, first visiting the valve and condenser departments, where plant has been installed for washing, filtering and treating the air to ensure its cleanliness and to maintain it at the uniform temperature and humidity required for the accuracy of the work carried out. The method of construction of the cases of the radio receivers from the raw timber was then seen, the visitors passing to the general factory where numerous small machines produce all the metal parts required. Conveyors are employed in the assembling of the various types of sets, which are all subjected to exacting audition tests before leaving the building.

This tour over, the delegates were again taken in buses, this time to the Hollinwood works, which have been the headquarters of the Ferranti activities since 1897. The transformer shop was seen first, and the visitors showed great interest in the cutting and welding of the transformer tanks and in the testing of transformers such as are used in the grid. Items of historical interest included a small alternator manufactured in 1882 and one of the original 10,000-V Deptford transformers which had been in service for over thirty years. Artificial lightning at a pressure of about 1½ million volts was also seen in the transformer department. The pressing and moulding, meter, tool, instrument and domestic appliance departments were also inspected.

Tea was taken in the company's canteen, and the visitors were brought back to Manchester in time for an evening at the Rusholme Repertory Theatre. On Saturday visits were paid to the cable works of Messrs. W. T. Glover & Co., Ltd., the Wylex Accessories Works, the C.W.S., and the Wythenshawe housing estates.

French Hydro-electric Schemes

The report for last year of the Société des Forces Motrices de la Truyère comments on the progress of the hydro-electric installations at Sarrans and Brommat. The last-named plant has now been in operation for about two years, but the 100,000-kW plant at Sarrans was only started in June last. During 1934 the output of the two stations reached a total of about 400 million kWh, which represents about half the full capacity of the stations. Since the beginning of August last power has been supplied in bulk to the Compagnie Électrique de la Loire and to the Compagnie Hydro-Électrique d'Auvergne, and since October 1st to the Paris area. Work is in hand on the erection of a 150,000-V transmission line between Monestrol d'Allier and Bagnols-sur-Ceze which is to be completed during the second half of the current year and will enable a supply of power to be given to the Marseilles district. Another 150,000-V line is being erected between the sub-station at Ruèyres, near Brommat and Clermont-Ferrand, which will allow of an increased supply to the Auvergne district. Plans are also being drawn up for the erection of a 220,000-V line between Ruèyres and Viviez to connect up the distribution system between Central France and the Pyrenées.

MEETINGS AND DISCUSSIONS

Current Topics and Opinions Expressed at the Institutions

The I.E.E. Transmission Section Outing

THE successful first session of the Transmission Section of the Institution of Electrical Engineers (formerly the Overhead Lines Association), which now has a membership of 1,500, was brought to a close with a most enjoyable outing in glorious weather on Saturday last.

Travelling by motor coach from Savoy Place to Croydon, the party first inspected the Central Electricity Board's 132-kV grid substation, which is of the "low extensible" type, but at present is laid out on the "three-switch" principle for adaptability. It is used as a link to connect two incoming 132-kV lines as well as the adjoining generating station of the Croydon Corporation to the grid.

The C.E.B. insulator test tower at Croydon

There are incoming lines from Beddington and Northfleet. The latter overhead circuit terminates at Croham Heights (about 2.5 miles away) and is brought into the substation by 132-kV oil-filled Pirelli-General cable. This underground section was necessitated owing to the proximity of the Croydon aerodrome to the only route suitable for an overhead line.

The transforming station is remote controlled from a board in the Croydon power station control room, which is connected with the main C.E.B. control at Bankside, and indicating and routine instruction apparatus enables Bankside to obtain the condition of switching arrangements, circuit loadings, &c., direct without the intervention of the local control staff.

Insulator Testing Equipment

The grid sub-station site also accommodates the C.E.B.'s testing station for investigating insulator surface leakage and the degree to which such discharges interfere with radio broadcast reception. This site is a suitable one for such testing owing to the presence of cooling towers, a refuse destructor, and a gas-works in the immediate vicinity.

The insulators are erected on a special tower from which are suspended twenty-one strings, and in addition eight strings are erected on a test rack at ground level. The testing supply is taken at 400 V from the auxiliary transformers associated with the main grid transformers and is stepped up to 85 kV by a single-phase outdoor type transformer. This arrangement ensures that insulator flashovers on the test tower do not affect the main grid supply. The insulators are kept continuously "alive" at a voltage of 85 kV to earth.

Facilities are available for measuring and continuously recording the magnitude of the insulator leakage currents. In addition, the power loss on the insulators and the phase angle of the leakage currents can be measured, and cathode-ray oscillograph equipment is provided so that observations on the wave-form of the leakage currents can be made. A high-voltage air condenser is also available for voltage measurement or for use in connection with a Schering bridge. Separate equipment for the comparative measurement of the radio interference from various insulators consists of a high-voltage transformer, the output being variable up to about 60 kV, which energises single insulator units or strings suspended within the hut, and audible and visible indication of the intensity of the radio interference is given by a wireless receiver fitted with a loud speaker and an output meter.

To correlate the weather conditions with the electrical characteristics of the insulators, meteorological instruments which give continuous records of atmospheric temperature, pressure and humidity are also provided.

Croydon's Generating Plant

The party next made a brief tour of the adjacent power station of the Croydon Corporation, which generates 50-cycle three-phase a.c. at 6,600 V and steps up to 33 kV. The generating capacity is 58,000 kW, the largest of the six turbo-alternators being a 25,000-kW 3,000-r.p.m. Metropolitan-Vickers set operating at 250 lb. per in. steam pressure at a temperature of 800 deg. F.

Condenser water-cooling towers are used, the make-up water being obtained from two 400-ft. artesian wells, which are capable of delivering 10,000 gallons per hour. This can be supplemented by 30,000 gallons per hour of treated sewage effluent obtainable through a pipeline from Beddington.

Liquid CO_2 fire-extinguishing plant is installed in the high-voltage "Metrovick" switchrooms. The eight Babcock & Wilcox boilers are provided with "Pneuconex" grit arrestors, with a 60-h.p. vacuum cleaning plant to extract the grit from the catchers at the bases of the chimneys and also for soot removal.

Afternoon Tour

Following light refreshments, provided by the C.E.B. in the power station control room, the visitors proceeded by road to East Grinstead where luncheon was served, Mr. R. Borlase Matthews, chairman of the section, presiding over the company of sixty-five. During the afternoon a tour was made of the Greater Felcourt all-electric farm, including the junior and senior co-educational schools associated therewith. There was also an exhibition of overhead-line equipment arranged by the Sevenoaks and District Electricity Co., Ltd.

Tea was served at the chairman's residence before the evening drive back to London.

A High-fidelity Radio-gramophone

THE paper by Mr. W. J. Brown which was read before the Wireless Section of the INSTITUTION OF ELECTRICAL ENGINEERS in London on May 13th describes in some detail a radio-gramophone with alternative upper frequency limits of 3, 5, 7 and 8 kc. per second. The range of volume levels has been increased by the inclusion of a form of "negative automatic volume control" in the audio-frequency amplifier, which section includes amplified a.v.c. and a selective quiet tuning and neon visual indicating circuit.

The moving-iron pick-up is of the conventional half-rocker arrangement, but has the following special features. The soft-iron armature is of the lightest cross-section consistent with high rigidity and ample flux-carrying qualities. The centre is broached out to a special hexagonal form so as to ensure the accurate and steady location of the circular needle. The needle-clamping screw is of a special alloy to reduce mass, at the same time giving a long life to the screw thread in service, and it is arranged to operate along the axis of rotation of the armature to minimise the moment of inertia.

The armature is pivoted in rubber sleeves between the shaped bottom jaws of the pole-pieces, which are of the half-rocker arrangement, but the length of the armature has been cut off just short of the upper limbs of the pole-pieces so that the armature is free to swing to any amplitude without striking against the pole-limbs. An important advantage of this arrangement is that the response varies in a truly linear fashion with amplitude of movement.

Special damping is applied to the tip of the armature, which is extended in the form of a brass paddle, the paddle being embedded in a pad of damping material. This damping material had to be specially developed in the chemical laboratory in order to satisfy simultaneously the requirements of high viscosity, low stiffness, good ageing properties, and ease of handling in assembly. The effect on response is to remove any localised peak, leaving a flat top extending up to 6,000 cycles, with a 10-db loss at 8,000 cycles per sec.

The exciting magnet and coil are conventional. A "humbucking" coil is wired in series with the ordinary pick-up coil of the armature in such a way that any hum voltages that may be picked up by the two coils cancel each other out. The arm is rigid and heavy, but is counterbalanced to reduce the pressure of the needle point on the record to 2 oz. Special needles are employed; they will satisfactorily track all frequencies up to 8,000 cycles per second. After playing sixteen

records (equivalent to a skidding distance of miles of recorded track, the pressure on the needle tip being 10 tons per sq. in.) the length of the "flat" worn on the needle tip is 0.002 in.

The driving motor is of the induction disc type, operating at 140 r.p.m. Its suspension from springs reduces the vibration transmitted to less than a quarter of that experienced with rigid attachment. The heavy turn-table and elasticity of the belt drive avoids speed variation. The centrifugal governor is gear driven in the usual way.

The frequency range is 50 to 8,000 cycles and the input to the speakers is linear up to 4 W at 50 cycles and 11 W above 100 cycles, the maximum input being 15 W. Two cone loud speakers of similar size, shape and characteristics are used. They are close together and radiate through the same baffle opening. Their position in the cabinet is such that there is reasonably large variation of baffle length between the front and back of the diaphragm.

The chassis and mechanism act as air dampers within the cabinet, which is made very heavy and rigid to avoid resonance. To eliminate feed-back the mechanical coupling is reduced by mounting the turn-table and pick-up arm on the stiff auto-mechanism framework which is, in turn, attached by springs to the body of the cabinet.

The speakers are inclined upward at an angle of 18 deg. in order to project the h.f. radiation upward and so reduce absorption by carpets. One of the moving-coil speakers is electromagnetic and the other has a permanent magnet, but their flux densities and air-gap dimensions are similar. The only reason for the electromagnet is the use of its field winding as a smoothing choke for the h.t. power supply.

The efficiency of a cone speaker falls off rapidly at the higher frequencies if the whole cone is allowed to act as a piston and move as a whole at those frequencies. Therefore the inner portions of the cones are made of aluminium, 0.004 in. thick and 8 cm. in diameter. The outer truncated portions are made of suitably treated pressed paper pulp.

The junction of the aluminium and paper is made with special cement and the periphery is suspended by soft velvet, which adds further damping to the cone edge. The final acoustic characteristic tests were made in an apartment furnished as an average living room. The design is due to the Gramophone Co., Ltd.

The Design of Rural Lines

TWO papers were discussed by the Transmission Section of the INSTITUTION OF ELECTRICAL ENGINEERS in London on May 15th. The first, by Mr. R. Dean, deals primarily in tabular and graphical form with the detail design of high- and low-voltage rural distribution lines. The author's main object has been to present his information in a form which may be easy to apply, and thus obviate many lengthy and tedious calculations.

All such lines must be designed to comply with the Regulations for Overhead Lines (El.C. 53) prescribed by the Electricity Commissioners for securing the safety of the public. The basic factors of design are therefore common to various types of construction, even though the detail design may vary considerably.

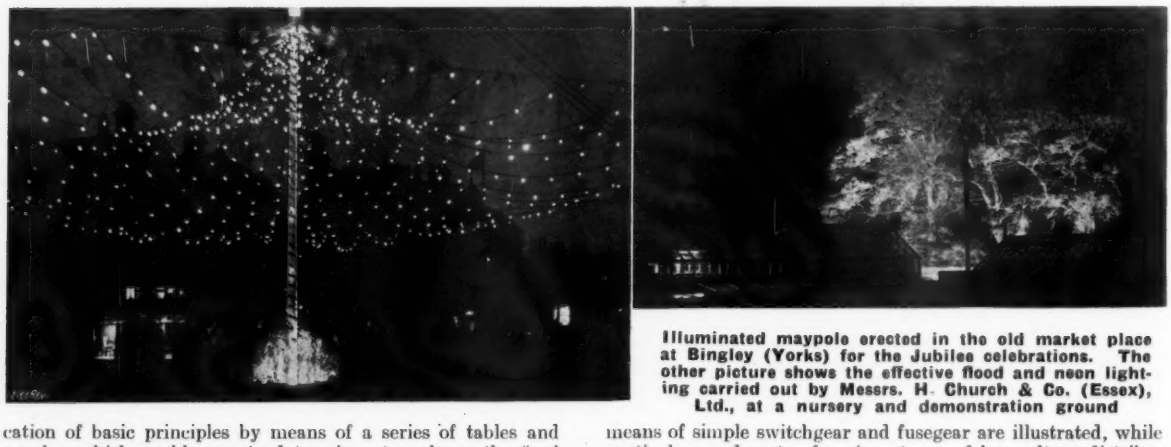
An attempt has been made to simplify and clarify the application of basic principles by means of a series of tables and graphs, which enable one to determine at a glance the final results, in much the same way as the complexities of the properties of steam have been clarified in the entropy diagram, or the effect of money rates operating over a number of years, is readily seen in interest or discount tables. The form of presentation of much of the data is original and no attempt has been made to include the usually accepted formulæ or fundamental principles, details of which may be found in any reliable textbook. Similarly details of the official regulations relating to overhead lines are not included.

The paper is divided into two parts, the first being a series of tables and graphs covering various aspects of line design, the second describing a number of practical details of design which have proved efficient in service.

The purpose of the second paper, by Mr. D. Ross, is to review recent simplification of design and reduction of cost.

Comparisons are made between 11-kV lines employing different types of conductor and the advantages of single-phase distribution are enumerated. The design of transformers and their capital and running costs are considered, and suggestions are made for standardisation of sizes. Methods of obtaining cheap and reliable protection on the high-voltage system by means of simple switchgear and fusegear are illustrated, while particulars and costs of various types of low-voltage distribution mains and services are given.

The difficulties encountered in some rural districts in obtaining adequate earths are recorded, and a strong recommendation is made that "all-insulated" installations shall be adopted wherever practicable, and that in all other cases earth-leakage switches shall be employed.



Illuminated maypole erected in the old market place at Bingley (Yorks) for the Jubilee celebrations. The other picture shows the effective flood and neon lighting carried out by Messrs. H. Church & Co. (Essex), Ltd., at a nursery and demonstration ground

The I.E.E. Annual Report

THE annual report of the Council of the Institution of Electrical Engineers for year 1934-35, which was presented by the president, Dr. W. M. Thornton, at the annual general meeting in London on May 16th, shows that during the year the membership grew by 531 to a total of 16,150. Honours and distinctions were conferred upon ten members, while 102 members died.

Examinations for National Certificates and Diplomas in electrical engineering resulted in 804 ordinary and 353 higher certificates, and eighteen ordinary and nine higher diplomas, being conferred, while forty-five higher certificates were endorsed in England and Wales. In Scotland nineteen ordinary certificates, sixteen higher certificates, and fourteen higher diplomas, were awarded. Eight scholarships of an aggregate annual value of £845 were awarded, and two grants of £50 each were made.

The members, Council and various committees held 510 meetings in London and at the local centres. Two more overseas local committees were set up, one at Calcutta and the other at Ceylon. The Wireless Section membership is now 728 and the average attendance at meetings was 130, compared with 157 last year. The Meter and Instrument Section membership is 603 and the average attendance was ninety-nine, compared with eighty-three. The Transmission Section had a successful first session; the membership has reached 1,550. The attendance at informal meetings has averaged ninety-four, compared with eighty-eight; informal meetings of the Wireless Section attracted attendances of 363. The aggregate student membership reached 3,670, and the total attendances 730, compared with 660. A new uniform set of rules applicable to all Students' Sections came into force on January 1st, 1935.

The attendance at the six deliveries of the Faraday Lecture was 4,000, of whom 3,050 were non-members; at the conversazione there were 1,963 members and guests, and at the annual dinner 811. The reference library was used by 7,391 readers, of whom 611 were non-members, and the leading library issued 3,266 books to 1,224 borrowers; 1,458 members subscribe to *Science Abstracts*.

The accounts show assets amounting to £210,337, an improvement of £7,363. The surplus on the revenue account was £8,516, compared with £4,998. The benevolent fund assets amounted to £25,711; donations and subscriptions reached £2,753, and grants from the fund to fifty persons amounted to £3,051.

New Books

Modern Heavy-Oil Engines Simply Explained. By R. BARNARD WAY. Pp. 267; illus. London: Percival Marshall & Co., Ltd. Price 5s. net.

The successful development of the high-speed internal combustion engine using heavy oil, such as is now being extensively employed for the driving of road vehicles, bids fair to have important reactions in other branches of engineering practice. A notable example of its use for direct-coupling to electric generators is found in the various types of Diesel-electric locomotives where, largely because of the high speed of rotation employed, the power-weight ratio can be kept within the limits demanded in railway practice. The author of this book explains the principles underlying the cycle of operations in the heavy-oil engine and, with one or two reservations, he has succeeded admirably. He first surveys his subject in four chapters, covering the compression-ignition cycle; fuel-injection systems; mechanical details; and lubrication and fuels. He then gives a description of the different commercial types classified in six chapters under the headings of "Stationary Engines," "On the Railway," "On the Railway-Electrical Transmission," "Marine Engines," "On the Road," and "In the Air." In his chapter on stationary engines the author is more concerned with the low-powered high-speed types (this probably being his interpretation of the word "modern" as used in his title), than with the units of, say, 3,000 to 5,000 h.p., which are extensively used in electrical power station practice, particularly in those countries where oil is cheaper than coal. True, he does mention the eight-cylinder double-acting two-stroke B. & W. engine developing 22,500 h.p. at 115 r.p.m., but no detailed description is provided. In the chapter on electrical transmission as applied to oil-engined locomotives he submits that this system secures all the advantages of railway electrification without the great disadvantages of high capital cost and lack of flexibility, but his strictures on the design of the electrical equipment on some of these locomotives will not meet with general agreement.

Throughout the book the diagrams reach a high standard of excellence, but in aiming at a colloquial style the author is slipshod in many of his sentences, some of which have no verbs. He uses the terms "Akroyd" cycle (after the British engineer Akroyd Stewart) for engines employing the airless system of fuel injection, whereas modern usage is to apply the term "Diesel" to all compression-ignition engines.

Practical Solution of Torsional Vibration Problems. By W. KER WILSON. Pp. 438; figs. 105. London: Chapman & Hall. Price 25s.

In the same series, size and binding as the recent issue of W. A. Tuplin's "Torsional Vibration," Messrs. Chapman & Hall have now issued Ker Wilson's "Practical Solution of Torsional Vibration Problems." Although there does not appear to have been any co-ordination in the preparation of the two books they are in a large measure complementary. While the first provided a detailed mathematical analysis of the practical problems, the present book is concerned with the numerical solutions, and the author's purpose has been to exhibit, in the working out of some thirty or forty examples, the application of the principles to the details of computation so as to provide a means of everyday reference for those whose work calls for this kind of investigation. Except in the simplest cases the problems of torsional oscillation are more or less indeterminate and the usual method of solving them is by means of equivalent dynamical systems and approximations of proved reliability. Each different arrangement of masses requires its own mode of treatment, standard forms and tables of data, and the author has elaborated these so that his reader can prepare the ground in the same way for his own particular range of investigation.

So that the subject can be studied without any further help an introductory chapter gives the fundamental equations on which the later calculations are made. The importance of the subject to the electrical engineer is indicated by the author, who states: "The heavy rotating masses necessary for satisfactory operation of generating sets direct-coupled to internal combustion engines render this type of installation susceptible to disturbing vibrations, and it is necessary to make sure that no critical or disturbing amplitude occurs near the operating speed," and he has included several examples from electrical engineering practice. These include the moments of inertia of d.c. and a.c. generators, the effects of altering dimensions in Diesel generator sets, forced vibration amplitudes and stress calculations, the dynamic characteristics of electrical generating sets and the calculation of the torsional frequency of a Diesel generator by the tabulation method. By means of the guidance afforded by these and the other examples from marine, automobile and general practice, no ordinary problem should present great difficulty to a reader of this volume.

Kohlebürsten. By DR. J. NEUKIRCHEN. Pp. 142; figs. 35+12 plates. Munich: R. Oldenbourg. Price (paper) 6.80 Rm.

This is a clearly written, excellently produced book, which should be equally useful to students, designers, and manufacturers. The author presents the results of prolonged observation of the behaviour of carbon brushes on d.c. machines of all sizes, together with conclusions concerning the causes of variation in the quality of commutation. The three main sections of the book deal respectively with the formation and destruction of commutator glaze and its effect on current distribution; the movements of the brushes, particularly the oscillations resulting from destruction of the commutator glaze; and the relations between visible sparking, imperfect contact at the edges of the brushes, and the causes determining the distribution of current flow.

In general, the transference and commutation of current occurs only within a relatively small area. If this area be at the edge of the brush, visible sparking is likely to be caused by imperfect contact, which may result from mechanical vibration or from the nature and distribution of the glaze. The physical and chemical properties of the atmosphere have important effects, and a number of cases are cited in which sparking followed rapidly on changes in atmospheric conditions, *e.g.*, damp weather, traces of chlorine, and so on. Stress is laid upon the discontinuity of the factors involved.

Typical cases of brush, commutator and slip ring deterioration are illustrated and discussed, and the behaviour of three extreme grades of brushes is analysed. By comparing the behaviour of a particular brush with that of the three types, an indication can be obtained of the change desirable. The evidence and arguments presented lead to the general conclusion that the brush material is of particular importance as regards its behaviour in relation to the commutator film and friction. These factors vary with the state of polish which, in turn, depends on atmospheric conditions.

Modern Radio Communication. By J. H. REYNER. Pp. 330; figs. 157. London: Sir Isaac Pitman & Sons, Ltd. Price 5s. net.

This is Volume 1 of the fifth edition of the book. The scope of the volume covers the preliminary and intermediate grades of the City and Guilds Examination in the subject, the final grade being covered in Volume 2. Apart from its use for these examinations, the volume forms an excellent introduction to the subject of radio communication, provided the reader has already an elementary knowledge of electricity and magnetism. Mathematics is avoided, and the author has succeeded in giving a clear, concise explanation of fundamental principles, with an indication of how they are applied in practice.

Almost all branches of radio communication are dealt with, and the author has chosen his material well, being careful to omit reference to apparatus or methods of working which have become obsolete since the last edition. Explanations are necessarily concise and sometimes sketchy, though always clear and accurate so far as they go. A number of useful questions and answers are included, and the 1934 City and Guilds examination papers are given as a guide to the student.

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Shorter Notices

A recent publication from the U.S.S.R. is one dealing with the "Dynamo-Electric Machine in Its Historical Development." (Leningrad: Academy of Sciences Press. Pp. 560; illus.) This book is the first issue of a third series of reports on the transactions of the Institute for the History of Science and Technology and is printed almost entirely in the Russian language. The frontispiece is a portrait of Michael Faraday, and the book is edited by Mr. V. Th. Mitkevitch from documents and materials collected by Messrs. D. V. Efremov and M. I. Radovskij.

"Problems in Electrical Engineering—with Answers." (Second edition.) Edited by S. Parker Smith. Pp. 210. London: Constable & Co., Ltd. Price 5s.

"The Measurement of Inductance, Capacitance and Frequency," by A. Campbell and E. C. Childs. Pp. 488; figs. 453. London: MacMillan & Co., Ltd. Price 30s.

An Incorrect Switch Connection

AT the inquest into the death of a child of eighteen months held last week at Bandon Hill, Surrey, evidence was given by Mr. A. E. Hammersley, district mains engineer of the County of London Electric Supply Co., Ltd., who had been asked, after the accident, to inspect the installation, for which the company, however, was in no way responsible. He found that a two-pin plug socket was controlled by a switch connected in the neutral wire so that a circuit fed from it would be alive even when the switch was off. Connected to the socket was a two-way adaptor, and near by was a sealed-off gas pipe. Mr. Hammersley expressed the opinion that the child had inserted one pin of a radiator plug into the socket, at the same time touching the other pin with his finger while making contact with the earthed gas pipe through some other part of his body. The circuit would be completed through the radiator element, as the switch controlling it was on. He stated that, for a person to receive a shock under these conditions, a chain of connected circumstances would be necessary, such as might not happen once in a million times. The coroner, recording a verdict of "Accidental death," said that he would make representations that switches installed before the issue of the Electricity Commissioners' 1934 Regulations should be tested.

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Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments. Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

B.I.F. Functions

With the opening of the British Industries Fair on Monday next our readers are reminded of the various functions which have been arranged. On Tuesday, May 21st, there will be a luncheon at which the leading electrical associations will be represented. The principal speaker will be Mr. E. E. Hoadley, president of the I.M.E.A. and president of the forthcoming National Electrical Convention. On Wednesday, May 22nd, the Association of Mining Electrical Engineers will attend a luncheon, and on the following day a tea has been arranged for the Birmingham and Midland Branch of the Electrical Association for Women. The Electrical Power Engineers' Association, and the E.A.W. will meet at luncheon on Saturday, May 25th, and in the afternoon the Students' Section of the South Midland Centre of the I.E.E. is having a tea. A further luncheon will be held on Tuesday, May 28th, at which many electrical and allied associations will be represented. Mr. H. G. Williams, M.P., executive director of the Incorporated Association of Electric Power Companies, will speak. The Prince of Wales is visiting the Fair on May 23rd. The general manager of the Engineering and Hardware Section of the Fair at Birmingham is Mr. C. Elliott, and the offices of the Fair are at the Birmingham Chamber of Commerce, New Street.

The E.D.A. Activities

In our issue of April 12th we gave particulars of the new processional car which the British Electrical Development

The E.D.A. processional car

Association is hiring out for local carnivals. We now reproduce a photograph of this car, which has already been booked by twenty electricity supply authorities. It was awarded first prizes in the recent carnival processions at Wood Green ("Northmet" Co.), and Norwich, and second prize at Eccles.

The Association's sales and publicity programme illustrates a window display for June, the subject of which is refrigeration. This display includes a centrepiece, and where it is not convenient to put an actual refrigerator in the window a plywood cut-out replica can be supplied. The programme also illustrates "model house" cut-outs. These novelties are designed primarily for children, and with an appropriate message concerning local facilities the model kitchen and bathroom should do valuable educational work. A new edition of the publication "The House You Want" is now available.

Registered Electrical Contractors

At the last meeting of the National Register of Electrical Installation Contractors, applications from the following for registration were accepted:—W. Hughes, Didsbury, Manchester; E. E. Prestwich & Co., Manchester; Cartwright Bros. (Little Sutton), Ltd., Little Sutton; J. A. Seddon, Droylsden, Manchester; and H. Uttley, Halifax. At the same meeting three applications were withdrawn and nine were declined.

Henry Wiggin & Co.'s Centenary

This is the centenary year of Messrs. Henry Wiggin & Co., Ltd., and the occasion is being marked this week by visits to the recently reorganised and extended works at Wiggin Street, Birmingham, and by a luncheon to-day in that city to which many distinguished guests have been invited. The works now represents one of the best equipped nickel-alloy mills in this country, and its electrical interest lies not only in the production of important materials for that industry, but also in the very wide electrical industrial applications in the shops, particularly the furnace equipment for both melting and heat treatment. In the ELECTRICAL REVIEW of May 27th, 1932, and January 5th, 1934, Mr. H. Williamson, A.M.I.E.E., chief engineer to the company, described the principal electrical applications, but since that time some notable additions have been made to the equipment. Butane atmosphere bright annealing furnaces for Monel metal and nickel sheets have recently been installed, resulting in greatly improved finish on the sheet products. The gas in the furnaces prevents the sheets from oxidising and the sheets are carried through the firing chambers on endless woven belts of "Glowray," the company's nickel-chromium-iron product. New continuous wire strand bright-annealing furnaces are also of outstanding interest and are responsible for the recently improved bright finish of the company's electrical resistance products. The company's association with the Mond Nickel Co., Ltd., has been remarkably successful, and a great variety of work is now undertaken in connection with the production of finished and semi-finished manufactures in nickel and its alloys, some of the most important of which are nickel anodes. The principal resistance materials are "Brightray" (nickel-chromium), "Glowray" (nickel-chromium-iron), "Dullray" (nickel-iron), and "Ferry" (copper-nickel). Last year the electrical consumption of the works was 6,128,000 kWh.

The Brussels Exhibition

The British Pavilion at the Brussels International Exhibition was formally opened on Friday last by Sir Esmond Ovey, the British Ambassador. Among those who attended the opening ceremony were:—Colonel Colville, M.P., Secretary, Department of Overseas Trade, and Sir Edward Crowe, Comptroller-General of the D.O.T.; the Earl of Lytton (president of the committee of honour); Mr. C. Taylor, Commissioner-General of the British Pavilion; Capt. Moore, Assistant Commissioner; Mr. Meredith, general manager of the Travellers' Association; and Mr. van Broeckhuizen, South African Minister. Speeches were made by Col. Colville, M. van Isacker, M. Max, Lord Lytton and Sir Esmond Ovey.

New Electricity Showrooms

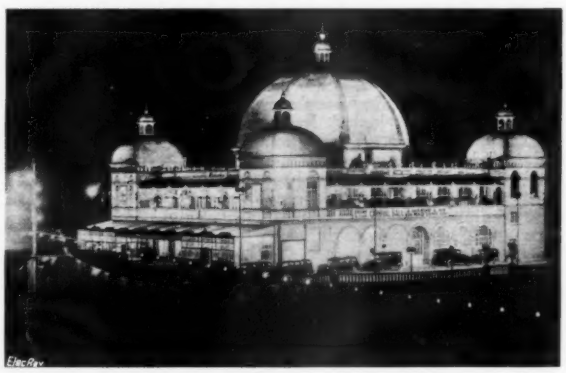
The Mid-Lincoln Electric Supply Co., Ltd., has opened a showroom at 30, Market Place, Grantham, in co-operation with Messrs. C. & C. Wright and Public Utilities (Electric), Ltd.

Japanese Lamp Veto in the United States

It is reported from Los Angeles that a legal decision has been given forbidding the import of Japanese electric lamps into the United States. The action was brought by the General Electric Co. of America against a group of Japanese merchants whose annual sales in the United States are estimated at 100,000,000 lamps. The company stated that the lamps were sold at reduced prices, had a shorter life and consumed more current than lamps made in the United States, and that its patent rights were being infringed. The Court decided that the company was entitled to compensation for the losses incurred through the sale of Japanese lamps. Notice of appeal against the decision has been given by the Japanese interests concerned.

Floodlighting of Rhyl Pavilion

The floodlighting of Rhyl Pavilion has been carried out by the Urban District Council, under the direction of Mr. E. B. Wright, A.M.I.E.E., the chief electrical engineer, Holophane floodlights being used. The floodlighting is all in coloured light and the main dome and the front elevation are provided with changing colour effects. The front elevation is illuminated by means of a number of lengths of weather-proof magazine colour flood batten arranged for three-colour lighting. This equipment is installed on the glass canopy over the entrance and employs 150-W lamps, clear prismatic re-



The Pavilion, Rhyl, which is illuminated by means of Holophane colour floodlights

flectors, special colour filters and has an overall height of 8 in. A motor-operated controller causes the circuits to be blended in different proportions. The most important feature

of the installation is the large centre dome. This is brilliantly colour-lighted by means of 2,000-W projectors provided with motor-operated colour screen mechanism to provide changes of colour. The spotlights are mounted in the smaller cupolas and there are also two mounted on poles some distance away. The motor-operated colour screen mechanism on these projectors is in turn controlled by a motor-operated master mechanism which causes the colour screens to be moved into and out of position in a special sequence. The two side elevations and four corner cupolas are illuminated by means of amber floodlights.

A Winning Window Display

In the window display contest recently organised by Hoover, Ltd., the first prize of £25 was awarded to the Hull Corporation Electricity Department. The display shown in the accompanying illustration represented a street of shops in which the central one was an electricity showroom with a

A Hoover display at the Hull Corporation Electricity Department

display of Hoover electric cleaners in the window. A number of figures rotated on an electric turntable giving the effect of a continuous stream of people entering the shop. The second prize of £20 was awarded to the County of London Electric Supply Co., Ltd., and the third prize of £15 was divided between Messrs. Gardiner, Sons & Co., of Bristol, and Leeds Corporation Electricity Department.

Vacant Factories and Sites

We have received from Messrs. Leopold Farmer & Sons, estate agents, of 46, Gresham Street, E.C., a booklet containing information regarding vacant factories and factory sites in and around London.

A Hotpoint Display

The accompanying illustration depicts a window display recently installed by the Hotpoint Electric Appliance Co., Ltd., in several corporation showrooms in the Midlands, which

A Hotpoint window display

particularly shows the types of appliances that were chosen for the King's House.

Trade Announcements

Messrs. Brown Brothers, Ltd., have built new warehouses at 93-97, Victoria Street, Bristol, which will be opened for business on May 20th. To facilitate removal to the new warehouses the old Temple Street premises will be closed on Saturday morning, May 18th. The telephone number and telegraphic address remain unchanged.

The Bristol branch of Philips Lamps, Ltd., has been removed to 112, St. Thomas Street, Bristol (telephone: Bristol 20307).

Messrs. A. Rist (1927), Ltd., inform us that the name of Flexible Electric Cords, Ltd., has been changed to Rist's Wires & Cables, Ltd., who will discharge all accounts due on and from December 1st, 1934. Any accounts dating from before December 1st should be submitted to Messrs. A. Rist (1927), Ltd., who are to be liquidated.

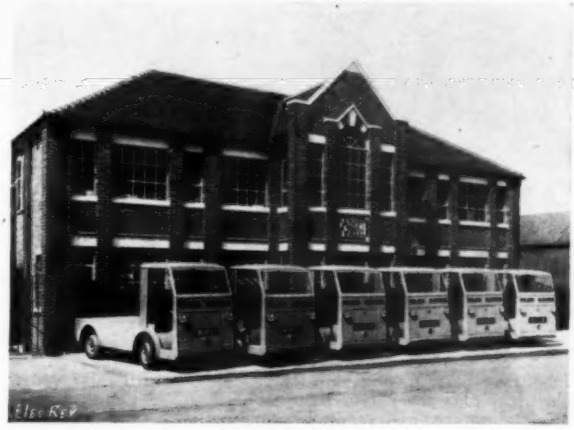
Mr. C. Cheeseman, representative in the North Midlands and Yorkshire for Kandem Electrical, Ltd., has removed to "Chelston," King Tree Avenue, Cottingham, East Yorks. The stores for consignment of goods remains at 51a, Ryde Avenue, Hull.

German Lamp Exports

After a long period of decline German exports of wire filament lamps have taken an upward turn. During the first three months of this year the number exported amounted to 10,692,400 lamps of the value of 2,293,000 Rm., being an increase of 4,000,000 lamps and 330,000 Rm. in value. The increase has applied to almost all markets. The number of lamps credited to England is 681,200 as compared with 507,700 in the first three months of 1934.

Electric Vehicles for the B.I.F.

The British Industries Fair authorities have ordered a fleet of Wilson 8-cwt. model L.W. electric vehicles with open deck bodies from Messrs. Partridge Wilson & Co., Ltd., for the Fair internal transport. The company claims that this is the first time that electric vehicles have been used at the Fair.



Wilson electric vehicles for the British Industries Fair, Birmingham

These vehicles are already in use engaged in the erection of stands and exhibits. The company states that it is proposed to run a similar fleet, equipped with seats for the conveyance of visitors on tours of inspection during the exhibition. The accompanying illustration shows a fleet of vehicles in front of the company's offices prior to being driven to Castle Bromwich.

Prices of Materials

Messrs. Frederick Smith & Co. report, May 15th: Electrolytic copper bars, £37 5s., £1 5s. increase. Ditto, ditto, wire rods, £41 15s., £1 5s. increase. Silicium bronze wire, 7½d., ½d. increase. No change in the price of electrolytic copper h.c. wire.

Messrs. Henry Gardner & Co. report, May 15th: Copper bars (best selected), sheet and rod, £62, £2 increase. English pig lead, £15 15s., 15s. increase.

Messrs. Edward Till & Co. report, May 15th: No change in the price of India rubber, Para fine.

French Electrical Imports

The appended table shows the French imports of domestic electrical appliances during the past two years. The French franc totals have been converted to sterling at 73¼ to the £.

	Imports. 1933. 1,000 Fr.	1934.
Electric fires and stoves	4,479	4,150
Electric irons	172	148
Electric vacuum cleaners, boot cleaners, etc.	4,382	3,986
Electric refrigerating machines, etc.	4,325	17,637
Electric fans	1,315	1,383
Total Fr.	14,673,000	27,303,000
Total at 73¼ Fr. at the £	£199,635	£371,465

The chief feature of the imports is the marked increase which is taking place in France in the purchase of imported household refrigerators, last year's total being over four times that of 1933. As a result of Government economy measures the French Customs authorities are condensing the informa-

tion given on the export side, only one total for the various items being now given. The figure for 1934 was 11,966,000 fr. (£162,800) against 9,650,000 fr. (£131,290) in 1933.

Orders Recently Booked

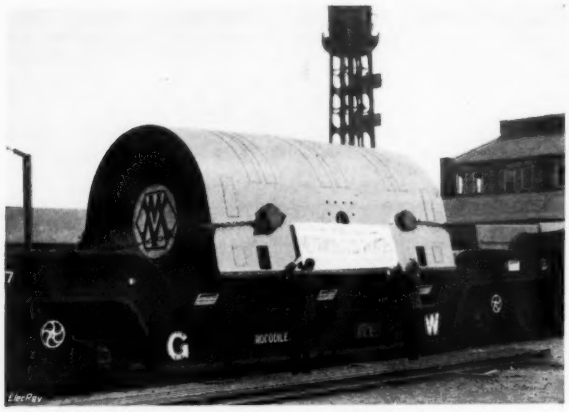
The orders received by International Combustion, Ltd., during April included a complete set of louvres and driving gear (per Stirling Boiler Co., Ltd.), and coal-handling plant for the Shropshire, Worcestershire and Staffordshire Electric Power Co., and two sets of "Usco" air-heater elements for the West Midlands J.E.A.

A Church-lighting Installation

Referring to the note on p. 573 of our April 19th issue, Messrs. Falk, Stadelmann & Co., Ltd., ask us to state that their "Efescalite" floodlighting units were employed in the lighting of the Caterham Hill Methodist Church.

Large Plant for Fulham

The accompanying illustration shows a stator of 89 tons, part of a 75,000-kVA alternator manufactured by the Metropolitan-Vickers Electrical Co., Ltd., for the new power station of Fulham Borough Council. The stator, being of a total



A "Met-Vick" stator ready for delivery to Fulham power station

width of 12 ft., special arrangements had to be made by the L.M.S. for night transport to Brompton and Fulham station, and for night haulage into the new generating station, using Messrs. Pickford's special road transport wagon capable of carrying 120 tons.

Irish Free State Electrical Imports

There was again great activity in the electrical trade in the Irish Free State during February last, the month's imports of electrical machinery and material during the month having attained a value of £73,170 as compared with only £49,837 in February, 1934. The appended table shows the imports during the first two months of the current and last years :—

	January—February. 1934.	1935.
	£	£
Electric motors	4,819	5,122
Other electrical machinery	24,452	40,193
Dry batteries and parts	3,582	3,681
Electric lamp bulbs	8,354	10,160
Electric lighting accessories, fittings, and parts ...	8,099	10,638
Electric wires and cables (insulated)	10,061	12,327
Telegraph and telephone apparatus	2,286	899
Radio receivers, complete	11,310	13,598
Radio-gramophones, complete	763	824
Other radio apparatus, fully or partly assembled ...	1,574	1,787
Radio parts and accessories	12,557	12,614
Other electrical goods and apparatus	26,951	32,868
Totals	£114,808	£144,711

The Exide Convention

The Exide Service Convention will be held at Eastbourne from May 28th-30th. In addition to the banquet, carbaret and dance on May 29th, a number of social functions have been arranged, including steamer excursions and golf.

In the Courts

In the Chancery Division on May 14th, Mr. Justice Luxmoore had before him a motion for judgment brought by the Westinghouse Brake & Signal Co., Ltd., of York Road, King's Cross, N., against Varsity Eliminator Co., Ltd., of Tower Works, Old Town, Clapham, S.W.

Mr. Kenneth R. Swan, who appeared for the plaintiff company, said the company asked for judgment against the defendants in default of defence. The plaintiffs manufactured rectifiers for use in wireless sets, including one type which provided high and low tension currents.

The plaintiffs' case was that the defendants had sold under the name of "British made Universal Mains Unit—Westinghouse Rectifier," rectifiers partly or wholly made up of components taken for genuine Westinghouse rectifiers, but altered or reassembled in a different manner from that employed by the plaintiffs. The plaintiffs asked for an injunction to restrain the defendants from selling as Westinghouse rectifiers apparatus so constituted and from selling under the name "Westinghouse" rectifiers not of the plaintiffs' manufacture. His Lordship made the order as asked.

Graph and Chart Papers

We have received from Messrs. Wightman Mountain, Ltd., a collection of examples of many kinds of sectional and graph papers in sample-book form as well as a sample set of sixty-five kinds of graph data sheets which cover practically all requirements for statistical and kindred purposes.

The showrooms of the Hull Corporation Electricity Department showing the illuminations during Jubilee week

Lamp Resistances for Battery Charging

A firm of radio and cycle dealers was summoned at Birkenhead police court on May 10th for using power energy for the purpose of lighting. It was stated that defendants had wired four lamps in parallel for shop lighting purposes and the current for these lamps came from the power circuit. Mr. Harold Rogers, partner in the defendant firm, said the place where the offence was alleged to have taken place was a workshop. The lamps were used as resistance in the charging of accumulators. The light from these particular lamps was of no use for lighting purposes. As a matter of fact, their shop premises where goods were displayed for retail selling were situated about 200 yards away. The magistrates dismissed the case.

Speedy Installation Work

One of the attractions of the Jubilee illuminations in London is the Regal Cinema, Marble Arch, W., for which the Dominion

Lavish exterior lighting at the Regal Cinema, W.

Electrical Co. supplied all the materials for the whole of the scheme. The company informs us that it took less than one day to connect 1,600 lampholders, the sun display, which has about 500 points, being connected and lamps fitted in two hours. The company's "Lite-on" patent strip-lighting holders were used. Another feature of the scheme is the fountains on the roof, which were supplied by the company, and are illuminated by changing-colour floodlights.

Winding-up Petition

In the Companies' Court (Chancery Division) on Monday, Mr Justice Crossman had before him a petition for the compulsory winding-up of the Highfield Electrical Co., Ltd. Counsel asked that the petition might be dismissed as a settlement had been arrived at. There was no support or opposition to the petition. His Lordship dismissed the petition with no order as to costs.

On the same day Mr. Justice Crossman heard a petition

for the compulsory winding-up of Electramonic (Foreign Rights), Ltd. Counsel stated that the debt had now been paid, and he asked that the petition should be dismissed without costs. His Lordship directed accordingly.

New Catalogues and Lists

A. Reyrolle & Co., Ltd., Hebburn-on-Tyne.—Pamphlets on the following equipment have been received:—Pillar type and metal-clad switchgear, cooker control units, metal-clad weather-proof air-break switches, fuses and plugs, metal-clad distribution gear, automatic air-break switches, "Easigo" plugs and sockets, multiple-way plug couplers, sealing bells, pedestrian-operated traffic signals, and equipment for driving and controlling rotary newspaper printing presses

British General Manufacturing Co., Ltd., Brockley Works, Brockley, S.E.4.—A leaflet on bakelite electrical accessories.

Marconiphone Co., Ltd., 212, Tottenham Court Road, W.1.—A brochure entitled "Cavalcade," briefly recording the progress of the electrical and radio industries from 1894 to 1935.

Watsham's, Ltd., Windsor House, Victoria Street, Westminster, S.W.1.—A booklet giving particulars of contracts received in connection with the grid.

Cooper & Smith, 14, Chicheley Street, York Road, S.E.1.—A leaflet on "Heley" electric light fittings.

Vislok, Ltd., Market Harborough.—A card dealing with "Vislok" triple lock-nuts.

Siemens Electric Lamps & Supplies, Ltd., 38, Upper Thames Street, E.C.4.—A leaflet relating to electric fans and a catalogue of shop-window lighting equipment, signs, &c.

Copes Regulators, Ltd., 5/11, Theobald's Road, W.C.1.—A pamphlet drawing attention to electric thrustor-operated valves.

Marelli & Co., Ltd., 19, Garlick Hill, Queen Victoria Street, E.C.4.—Two fan leaflets including details of the new "Nastrovent" type.

Klaxon, Ltd., 36, Blandford Street, W.1.—Particulars of the new "Comfortair" fan.

Erskine Heap & Co., Ltd., Lancashire Switchgear Works, Caroline Street, Salford, Manchester, 7.—A leaflet on a new push-button contactor.

British Insulated Cables, Ltd., Prescot, Lancs.—A leaflet giving particulars of tapes and binders for telegraph and telephone purposes.

British Electric Domestic Appliances, Ltd., 3, Hanover Court, Moor Lane, E.C.2.—A copy of the new "Bedal Bulletin."

Bankruptcy Proceedings

F. N. Horsley, 32, Yates Street, Derby, formerly trading as the Radio Service Co., Mount Street, Heanor.—The first meeting of creditors was held on May 10th at the Official Receiver's office, 22, Regent Street, Park Row, Nottingham. The statement of affairs disclosed gross liabilities of £215, of which £200 was expected to rank for dividend, and there were assets of £14, leaving a deficiency of £186. The debtor attributed his failure to bad trade and lack of capital. The case was left in the hands of the Official Receiver.

A. E. Beaumont, 216, Manchester Road, Thornton Lodge, Huddersfield, electrical and radio engineer.—The first meeting of creditors was held recently at the Official Receiver's office, 71, Manningham Lane, Bradford, when the debtor attributed his failure to losses on shares in a limited company, want of capital, loss by forced sale of stock and trade effects, bad debts, and insufficient profits to meet living expenses. The statement of affairs disclosed gross liabilities of £1,216, of which £919 was expected to rank for dividend, and there were assets of £81, with a deficiency of £837.

A. D. M. Mayer, 75, Pasture Road, Goole, formerly at Market Place, Howden, electrical engineer and wireless specialist.—The public examination took place recently at Wakefield, when it was stated that the gross liabilities amounted to £1,152, of which £636 was expected to rank for dividend. There was a deficiency of £268. The failure was attributed to bad trade due to keen competition and depression in trade in the district, the effect of the introduction of the wireless relay system, and depreciation in the value of stock. The examination was closed.

H. Etherington, Lawn Villa, Moorgate, and 104, Micklegate, York, electrical and refrigerating engineer and contractor.—The first meeting of creditors was held at the Official Receiver's offices, 17, High Ousegate, York, on May 7th. Debtor had prepared a statement of affairs which showed gross liabilities of £3,700, of which £1,250 was expected to rank for dividend, and there were no assets. He attributed his failure to a judgment obtained against him. The matter was left in the hands of the Official Receiver, as trustee.

I. Mac. Walker and **D. B. Beavan,** radio and electrical retailers, 2, The Arcade, Swiss Cottage Station, Hampstead, N.W.—First and final dividend of 1s. 7d. in the £, payable May 21st at the offices of Messrs. Corfield & Cripwell, Balfour House, Finsbury Pavement, E.C.

H. T. Ballantyne, 14, Waterloo Crescent, Bramley, Leeds, electrical engineer.—At the public examination held recently at Leeds it was stated that there was a deficiency of £175. The examination was adjourned for closing.

L. D. Whittaker, radio dealer, 72, King Street, Dukinfield.—Receiving order made May 3rd on debtor's own petition. Public examination May 27th at the Town Hall, Ashton-under-Lyne.

F. W. Smart (Edgbaston Electrical Co.), electrical contractor, 212, Edward Road, Cannon Hill, Birmingham.—First meeting May 17th at 159, Great Charles Street, Birmingham. Public examination May 29th at the Court House, Corporation Street, Birmingham.

I. L. Lawrence, electrician, 11, Grand Parade, Brighton.—Application for discharge to be heard on June 6th at the Court House, Church Street, Brighton.

J. C. De Wardt (De Wardt Radio), radio and electrical engineer, 10, Windmill Street, Gravesend.—Trustee, Mr. A. H. Partridge, 3, Warwick Court, Gray's Inn, W.C., appointed May 4th.

F. O. Tosswill, electrical engineer, 60, Wodeland Avenue, Guildford.—Trustee, Mr. E. H. Hawkins, 4, Charterhouse Square, E.C., released March 27th.

D. J. Watkins (Watkins & Son), wireless and electrical engineer, 72, Victoria Road, Surbiton.—Trustee, Mr. C. R. Waterer, 29, Russell Square, W.C., Official Receiver, released April 24th.

E. Whitehouse, radio engineer, 29, Westfield Street, St. Helens.—Trustee, Mr. P. S. Booth, 2, Bixteth Street, Liverpool, released April 12th.

H. Pickup (Electrical and Wireless Stores), electrical engineer, 12, Frank Street, Barnoldswick.—First and final dividend of 1s. 10½d. in the £, payable May 22nd at 71, Manningham Lane, Bradford.

G. A. Glazebrook (Coventry Electrical and Wireless Supplies), radio engineer, 27A, Victoria Street, Coventry.—First and final dividend of 1s. 6½d. in the £, payable May 17th at 9-11, High Street, Coventry.

T. E. Crossley, electrical engineer, 16, Ashfield Avenue, Morley.—Public examination June 6th at the County Court, Dewsbury.

Company Liquidations

Strand Electric & Engineering Co., Ltd.—Winding up voluntarily for reconstruction purposes. Liquidator, Mr. R. Hunter, Aldwych House, Aldwych, W.C. The registration of a new company of the same name was recorded in our last issue.

Novo Radio Electric, Ltd.—Meeting June 5th at 2, Saville Place, Newcastle-upon-Tyne, to receive an account of the winding-up by the liquidator, Mr. R. E. Smith.

British Dry Cell Co., Ltd.—Meeting June 11th at 8, Serjeants' Inn, Temple, E.C., to receive an account of the winding-up by the liquidator, Mr. C. Wakeling.

C.C.A. (Central Cables & Accessories), Ltd.—Particulars of claims by June 5th to the liquidator, Mr. T. A. Blow, 138, Lever Street, E.C.

Pewsey Electric Lighting Co., Ltd.—Meeting May 29th at London House, Pewsey, to receive an account of the winding-up by the liquidators, Messrs. A. J. Phillips and T. Fowle.

Rex Radio Corporation, Ltd.—Meeting May 27th at 8, Queen Street, E.C., to receive an account of the winding-up by the liquidator, Mr. E. H. Stringer.

Meeting of Creditors

A meeting of creditors of Messrs. Sykes & Dyson, Ltd., will be held at the Y.M.C.A., 16, John William Street, Huddersfield, on May 22nd.

Egypt's Electrical Imports

THE negotiation of a new trade agreement with Egypt lends special interest to the recently-issued foreign trade returns of that country for 1934. From these the following figures relating to the import trade in electrical goods have been taken, a note being added of the increase or decrease compared with 1933.

The total of the group last year was £680,500 (Egyptian) against £659,000 in 1933, an advance of £21,500 but still nearly £200,000 below the 1931 figure. Although detail regarding country of origin is meagre there is evidence that the United Kingdom has kept its share of the trade.

Radio receiving sets are shown separately in 1934 for the first time. In addition there were imported parts and fittings for radio sets valued at £7,400 and other wireless apparatus and parts valued at £28,400, the total value of radio material being thus £186,800. The corresponding total in 1933 was £123,400. The Egyptian £ is about 6d. above the pound sterling.

	1934. £E.	Inc. or dec. £E.
Generators, motors and transformers, 1,000 kW or over	30,000	—
Ditto, 50 to less than 1,000 kW.	41,100	+ 2,600
Ditto, 15 to less than 50 kW.	4,700	— 300
Ditto, less than 15 kW.	4,900	— 1,600
Batteries, pocket—		
Total	1,000	+ 200
Batteries, other, and parts—		
Total	10,900	— 100
Accumulators and parts—		
Total	20,800	— 2,200
Submarine and underground insulated cable—		
Total	40,000	— 44,000
From United Kingdom	4,900	— 8,200
„ Belgium	9,100	— 12,400
„ France	6,100	— 16,200
„ Germany	14,800	+ 4,400
Other insulated wire and cable		
Total	30,600	— 7,400
Fans—		
Total	3,500	— 700
Radio valves—		
Total	10,700	+ 2,700
Lamps—		
Total	43,800	— 8,800
From United Kingdom	6,800	+ 400
„ Austria	300	— 4,800
„ Germany	5,600	+ 800
„ Holland	12,500	— 3,100
„ Japan	6,200	+ 1,400
„ Hungary	8,200	+ 4,400
Radio receiving sets—		
Total	156,000	*
From United Kingdom	9,700	—
„ Germany	10,000	—
„ United States	80,000	—
„ Holland	42,000	—
Electro-medical apparatus—		
Total	19,300	+ 7,300
Electrical signalling apparatus—		
Total	2,300	— 6,700
Other telegraph and telephone apparatus—		
Total	77,000	+ 23,000
From United Kingdom	74,000	+ 23,000
Domestic appliances—		
Total	8,300	+ 1,800
Electric porcelain, glass, etc.—		
Total	4,000	— 3,600
Electrical apparatus not elsewhere specified—		
Total	132,000	— 12,000
From United Kingdom	43,500	— 10,000
„ Germany	26,700	— 3,300
„ Switzerland	15,400	+ 6,100
„ France	14,600	— 3,400
„ Belgium	9,800	— 3,200
„ United States	9,200	+ 300

* Not specified in 1933.

Electricity Supply

Lighting, Domestic, Power

Australia.—PROPOSED NEW POWER STATION.—A private enterprise contemplates constructing a generating station at Narrabri to supply electricity to a number of towns in north-west New South Wales. The scheme provides for transmission lines carrying h.v. supplies to several centres, and extensions would be made later.

Bedford.—LOANS.—The Electricity Committee is to borrow £4,210 for plant and £7,738 for extensions.

Belgian Congo.—INCREASED USE OF ELECTRICITY.—The sales of power by the Société Générale des Forces Hydro-Electriques du Katanga (Sogefor) during last year were 89,350,000 kWh, as compared with 47,270,000 kWh in 1933, the main cause of the increase being the completion of a power transmission line to supply the Elisabethville area, and partly to an increased demand for power by the Union Minière du Haut-Katanga.

Birkenhead.—CORPORATION TO SUPPLY WIRRAL AREA.—A special meeting of the Town Council was held last week to approve an application for a Special Order authorising the Corporation to become the distributors of electricity for the whole of Wirral, with the exception of the Wallasey and Hoylake Councils' areas.

Bristol.—HOUSE SERVICES.—Sanction is being sought by the Electricity Committee to a loan of £150,000 for house services.

EQUIPPING AN AERODROME.—The Aerodrome Committee is to provide wireless and meteorological stations and lighting equipment at the aerodrome at a cost of £1,800.

Bulgaria.—LARGER OUTPUT.—The Compagnie d'Electricité de Sofia et de Bulgarie reports that the sales of power during last year attained a total of 34,467,000 kWh, as compared with 34,133,000 kWh in 1933. The number of consumers supplied increased during the twelve months from 54,545 to 56,471, and the load from 24,034 to 25,500 kW.

The Italian Gardens, Blackburn, showing the tulip beds illuminated for the Jubilee. The flowers were seen in their natural colours

Carlisle.—RURAL EXTENSIONS.—Mains are to be extended in the rural area at a cost of £1,744.

Chesterfield.—SUB-STATION.—A new sub-station is to be erected in Hawksley Avenue at a cost of £970.

BULK SUPPLY.—Following a conference between the Electricity Committee, the Electricity Commissioners and the Derbyshire & Nottinghamshire Electric Power Co., it has been agreed that the company shall negotiate with a view to affording a partial bulk supply to the Corporation during a trial period of six months from July 1st next.

Dartford.—NEW TRANSMISSION LINES.—The Rural District Council has consented to the Kent Power Co. and the West Kent Electric Co., Ltd., laying 11,000-V underground mains from Southfleet to Eynsford, *via* Stone, Darenth, Horton Kirby, and Farningham. The Kent County Council has given its consent to the use of overhead lines through Hartley and Fawkham by the West Kent Electric Co., Ltd.

Eastbourne.—SUB-STATIONS.—The Electricity Committee has purchased sites on the Cherry Garden estate for the erection of two sub-stations, and is to erect a sub-station and extend mains at a cost of £4,084 to provide supply to the Ersham Lodge estate, Hailsham.

EXTENSIONS.—Mains are to be extended at a cost of £322 to supply the Lawns estate, Ocklynge Road.

East Ham.—BATTERY CHARGING TARIFF.—The Electricity Committee recommends that the tariff for electric vehicle battery charging shall be at the heating rate, *i.e.*, 1d. per kWh for the first 200 kWh, and ¾d. per kWh for the remainder, with no restriction as to hours of use.

SUB-STATIONS.—Sites are to be obtained in Central Park Road and near the town hall for the erection of two sub-stations.

France.—A H.V. POWER LINE.—The Société Union d'Electricité (Paris) has recently been authorised to proceed with the erection of a new 220,000 V transmission line between the sub-station at Chaingy (Loire) and a sub-station at Chevilly (Seine), a distance of about 75 miles. The line will have a capacity of 100,000 kW, and will comprise three conductors of aluminium with steel core, the total sectional area of each conductor being 350 sq. mm.

Gainsborough.—LOWER CHARGES.—For the fourth successive year the Urban District Council has decided to reduce the charges for electricity. The present revisions are set out in a pamphlet which has been sent to us by Mr. H. Breckell, the engineer and manager, and are as follows: Rate A, from 4½d. to 4d. per kWh; prepayment meter, 5d. to 4½d. per kWh; assisted wiring, 7d. to 6½d. per kWh; B (business alternative tariff), from 6½d. to 6d. and 2d. to 1¾d. per kWh; C (domestic), all electricity in excess of 120 kWh per quarter at ½d. per kWh; D (shop windows), from 2d. to 1¾d. per kWh, minimum charge reduced from £4 to £3 10s.; E, first 60 kWh instead of 80 kWh per h.p. installed at 2½d. per kWh; G (heating), 1d. per kWh.

Gateshead.—NEW CABLES.—The North-Eastern Electric Supply Co., Ltd., is to lay cables in Eastbourne Avenue, High Street, and the Wrekenton Park Road extension.

Gravesend.—AN ALL-ELECTRIC HOUSE.—The Housing Committee has agreed to place a house on the West Court Farm estate at the disposal of the Electricity Committee for the purpose of an experiment in all-electric supply.

Grimsby.—ELECTRICITY FOR WOLD VILLAGES.—A proposal, originally introduced last September, for the extension of the supply to Binbrook and Fotherby at a cost of £7,000 has been passed by the Electricity Committee.

Hailsham.—OVERHEAD LINES ALLOWED.—The Rural District Council has consented to the use of overhead lines by the Weald Electricity Supply Co., Ltd., in the Cowbeach area.

Harrow.—FUTURE OF SUPPLY.—The Urban District Council has appointed its chairman and three councillors to confer with the Harrow Electric Light & Power Co., Ltd., with regard to the action to be taken on the expiration, in 1937, of the company's rights in respect of electricity supply in Harrow.

Hatton.—SUPPLY TO MENTAL HOME.—The Warwickshire County Council Mental Hospitals Committee has arranged to take supplies from the Leicestershire & Warwickshire Electric Power Co. to deal with the night load at Hatton Mental Colony. Instructions have been given for the purchase of a motor generator to convert the company's supply from a.c. to d.c.

Hazel Grove.—HIRE-PURCHASE TERMS.—Hire-purchase terms for various types of electrical apparatus have been approved by the Hazel Grove (near Stockport) Council. Cookers may be purchased on hire-purchased terms over a period of seven years; hot-water circulators and water heaters, five years; wash-boilers, vacuum cleaners and washing machines, three years; other approved apparatus, two years. The accommodation fee is a variable percentage of the purchase price according to the period of repayment.

Ilford.—LOANS.—The Electricity Committee is seeking sanction to borrow £25,000 for mains and services, £5,000 for wiring installations and £5,000 for apparatus for hire.

Japan.—NEW POWER STATION.—The Osaka municipality is to erect a power station equipped with four turbo-generators rated at 2,100 kVA each. One of these is to act as a standby.

Lichfield.—LOANS.—The Council has received sanction to loans of £3,000 for mains and services, £300 for plant, £1,000 for meters, £1,500 for wiring installations, and £400 for consumers' apparatus.

Liverpool.—STREET LIGHTING.—Experiments are being carried out with sodium electric-discharge lamps for street lighting. It has been found that 300-W gasfilled lamps placed 40 yards apart do not give such good lighting as 70-W sodium electric discharge lamps placed 30 yards apart.

Macduff.—AN ELECTRICITY PROPOSAL.—A special meeting of the Town Council is being held to consider plans and proposals submitted by the Grampian Electricity Supply Co. for the supply of electricity to the burgh. The proposals include details of the route of the cables which the company proposes to erect and which will be carried on overhead poles of pleasing design. If the Town Council decides in favour of electric street lighting the company will be prepared to extend its scheme to every street in the burgh where street lamps are erected.

Manchester.—CHEAP ELECTRICITY.—Referring to the charges mentioned on page 680 of last week's issue, Mr. H. C. Lamb, the chief engineer and manager, has requested us to state that there is also a fixed charge based on the rateable value of the whole building, and the electric cookers installed are of the breakfast-cooker type.

Mold.—SPECIAL ORDER.—The Urban District Council is to apply for a Special Order to enable it to supply electricity in that part of the urban district which, prior to the coming into operation of the Flint Review Order, 1934, comprised part of the parish of Mold Rural in the Rural District of Holywell.

North Wales.—ELECTRIFICATION OF RURAL AREAS.—The North Wales and South Cheshire Joint Electricity Authority has decided to prepare a case for submission to the Minister of Transport urging that financial assistance be given to schemes for the electrification of rural areas. The matter arose when the Authority considered a £30,000 scheme for a supply to the urban district of Amlwch (Anglesey) by the North Wales Power Company. Representatives of the Power Company stated there was very little likelihood that the scheme would be a paying proposition unless financial assistance were given. Mr. Price White, Bangor, supporting, suggested that they should also urge the Electricity Commissioners to allow the Power Company to utilise a balance in hand of £26,000 from the previous rural development schemes towards defraying the cost of the Amlwch scheme. This suggestion was adopted by the J.E.A.

The first transportable light-tower in use at the Tempelhof Aerodrome, Berlin

Norwich.—SUB-STATION.—The Electricity Department has decided to erect a sub-station at River Lane, Barrack Street, to serve the district.

Otley.—NEW EQUIPMENT.—Otley Cattle Market Options, Ltd., is to erect a sub-station and meter house in Bridge End.

Oxford.—SWITCHGEAR.—The City Council proposes to apply for sanction to a loan of £4,200 for switchgear.

Pendleton (near Clitheroe).—SUPPLY INAUGURATED.—An electricity supply provided by the Lancashire Electric Power Co. was made available recently in the village, and a successful two-day electrical exhibition was held there.

Poland.—HYDRO-ELECTRIC WORKS.—It is announced from Warsaw that the Waterway Department of the Ministry of Communications has now under consideration offers received for works in connection with the construction of a dam and hydro-electric works at Roznowie, on the Danube. Both Polish and foreign financiers are supporting the scheme, and two prominent Swiss experts have been called in to give advice.

Portishead.—SUB-STATION.—The North Somerset Electric Supply Co., has purchased a site from the Bristol Corporation in Beach Road for the erection of a sub-station.

Rhodesia.—HYDRO-ELECTRIC POWER STATION.—Sir Hubert Young, Governor of Northern Rhodesia, recently cut the first sod on the site of the hydro-electric power station to be built near the Victoria Falls, on the Zambesi River.

The work includes the establishment of a hydro-electric station in the Silent Pool gorge and the construction of a canal from a point a few hundred yards above the Eastern Cataract, on the north bank of the Zambesi, to convey the water to the turbines.

Ripon.—LOAN.—Sanction has been obtained by the Electricity Committee to borrow £4,923 for mains, services and plant.

Rochdale.—LOANS.—The Town Council has approved a report on the desirability of changing over the east end of the town from d.c. to a.c., and application is to be made for sanction to borrow the sum of £9,400 for this purpose. It was also resolved that an additional application should be made for sanction to borrow £7,000 in respect of expenditure on unspecified mains to March 31st, 1935, and £8,000 on services to March 31st, 1936.

South Africa.—BLOEMFONTEIN.—Plans are being prepared for an extension of the municipal power station as the annual consumption is now about 20,000,000 kWh, as compared with only 8,000,000 kWh eight years ago, and during peak loads the station has to operate at full capacity. The estimated cost is £100,000, and it will be necessary to enlarge the capacity of the station by two-thirds. A considerable saving is expected to result from the use of steel framework instead of concrete. The scheme will be referred to the Union Electricity Supply Commission for consideration and approval before it is submitted to the Town Council or the ratepayers.

ORANGE FREE STATE.—The Bethlehem Town Council has decided to apply to the ratepayers for authority to make a change-over from d.c. to a.c. in the town at an estimated cost of £50,000. A year ago a similar proposal was rejected because it was thought that the Government would electrify the railway as far as Bethlehem and that power could then be obtained from the Electricity Supply Commission. Now, however, it is ascertained that the prospects of electrification are too remote to be considered, though there is a possibility that the Electricity Supply Commission may take over the existing generating system.

Southend.—ILLUMINATIONS.—Special illuminations and lighting effects, costing £10,000, have been arranged to celebrate the visit of the Home Fleet this week. The centenary of the pier occurs this year and £4,000 has been voted for illuminations to mark the occasion.

Swansea.—REWIRING A SCHOOL.—The Education Committee is to rewire Mumbles Council School at a cost of £159.

Tadcaster.—PROPOSED SUPPLY EXTENSION.—The Rural District Council has asked the North Lincolnshire & Howdenshire Electricity Co., Ltd., to consider the question of giving a supply of electricity to the parishes of Appleton Roebuck, Colton and Bidbrough.

Tasmania.—HYDRO-ELECTRIC COMMISSION'S REPORT.—In spite of reductions in tariffs, the revenue of the Hydro-Electric Commission for the year ended June 30th last, at £393,183, was £4,606 more than that for 1932-33. The extension of the supply to some of the outlying parts of the State, where the cost of service is proportionally greater than in closely settled areas, is mainly responsible for an increase of £5,991 in working expenses (£68,271). Interest on loans declined from £237,615 to £196,620, but an increase from £81,097 to £119,775 in depreciation, &c., brought the total revenue expenditure to £384,666 (£380,992), leaving a credit balance of £8,518, as compared with £7,585. Electricity generated increased from 338,484,500 to 348,982,730 kWh. Sales of electric cookers have remained very satisfactory in the Hobart district, and the number of electric water-heating installations is steadily increasing. Extensions of h.p. lines (20 miles) and l.p. lines (17 miles) were carried out in the country district areas, resulting in an increase from 7,255 to 8,181 in retail consumers.

Torquay.—LOAN.—The Electricity Committee is seeking sanction to borrow £8,080 for the acquisition of the undertaking of the Teignmouth Electric Lighting Co. in the parishes of Haccombe and Stoke-in-Teignhead.

Wallsend.—CABLES.—The Town Council has approved plans submitted by the North-Eastern Electric Supply Co., Ltd., for electric cables on the Rosehill estate and in Archer Street and Station Road.

Walthamstow.—PLANT IMPROVEMENTS.—The Town Council is to equip sub-stations at an estimated cost of £7,778, and to instal transformers of double the present capacity at the Wood Street and Queen's Road sub-stations, at a cost of £1,136.

This historical church (St. Katherine's) at Milford Haven, is a good example of Jubilee floodlighting by one of the smaller local authorities

Wantage.—EXTENSIONS AT GROVE.—Wessex Electricity Co. proposes to extend l.p. mains at Grove.

Wick.—ELECTRIC FIRES PREFERRED.—A long discussion took place recently at a Town Council meeting on the question of whether electric fires or coal fires were most economical for the bedrooms of Council houses. It was agreed that electric fires should be installed.

Wolverhampton.—IMPROVED LIGHTING.—A scheme has been prepared for improved street lighting costing £9,687 and another for the conversion of the existing two-phase system to three-phase in Tettenhall, Penn and Heath Town—three of the added areas—at a cost of £98,543.

Worthing.—MAINS.—Sanction has been obtained to a loan of £5,000 for mains.

York.—SUPPLY TO COPMANTHORPE.—The Electricity Committee is to borrow £2,028 for mains and £210 for a sub-station in connection with the supply to Copmanthorpe.

Traction

Argentina.—New Buenos Aires Underground.—Work has now begun at Buenos Aires on the fourth underground railway line owned by the Compañía Hispano Argentina de Obras Públicas y Finanzas. It is to start from the Plaza de Mayo and connect the districts of Palermo, Belgrano and Saavedra, running the length of the Diagonal Roque Sáenz Péña, Córdoba, Santa Fé and Cabildo avenues. It will be over seven miles long and the longest underground line in the city. It is to have nineteen stations, with platforms 104 m. long, and the trains, which will each have accommodation for 240 passengers, will run every two minutes. It is hoped that the first section of the line, from Plaza de Mayo to the Pueyrredon and Santa Fé crossing, will be finished by the end of next year, states *Reuter's Trade Service.*

Belgium.—Railway Electrification Proposal.—The opening of the electrified line between Brussels and Antwerp is to be followed by the conversion of other lines to electric traction. A Parliamentary committee has now begun the examination of schemes in connection with lines radiating from Brussels.

Denmark.—Electrically-welded Rails.—Electric welding of rails is now the general practice on the Danish State Railways. In all main-line track renewals two 15-m. rails are welded to form 30-m. lengths. Long welded lengths are used to avoid rail joints on bridge girders, while there are welded lengths of 600 m. in the tunnel between Copenhagen and Osterport, these having given no trouble during the year that they have been in service. An experimental stretch of track has been laid near Salzwedel, in Germany, in which there are only a dozen joints in 36 miles, the rails being electrically-welded into 3½-mile lengths.

Germany.—Electrified Line Opened.—The electrified line between Augsburg and Nürnberg has been opened to traffic. For this scheme it was necessary to erect a 100,000 V line between Landshut and Treuchtlingen for connection with the overhead feeder network. The electrification of the line represents the second section of the future line between Berlin, Nürnberg and Munich, and the through connection between Berlin and Rome has thus been brought a stage nearer completion.

Great Britain.—Electrified Railways.—On May 13th, in the House of Commons, Mr. West asked the Minister of Transport how many miles of British railways were electrified in 1900, 1910, 1920, 1930, and to-day. Captain Hudson said that the route miles of electrified railways in Great Britain at the end of the years 1900, 1910, 1920, 1930 and 1934 were respectively about 25, 203, 370, 615 and 702.

Southern Railway.—The first electric train ran on the recently electrified extension to Seaford last Sunday.

London Underground Railway Plans.—Consideration of the London Transport Bill by the Select Committee of the House of Commons, mentioned in our last issue, was continued this week. The Abbey Road Building Society had complained that the new tube railway at Baker Street would endanger its Abbey House, but Sir Harley Dalrymple-Hay, consulting engineer, said that there would be no danger. He pointed out that the Piccadilly tube railway was constructed under the heavy clock tower at King's Cross and no damage had resulted. Mr. G. L. Vigers, surveyor, said that his firm had dealt with all the compensation cases arising out of the building of tube railways; in the last twenty-four years, during which thirty miles of tunnels had been built, only £11,535 had been paid for damage.

Russia.—The Moscow "Underground."—It is reported in *The Times* that four engineers of the London Passenger Transport Board arrived in Moscow on May 13th to attend the formal opening to regular traffic of the first section of the Moscow Underground railway. On Tuesday M. Rottert (chief engineer of the new underground railway) conducted the visitors on a tour of inspection of the system, which is between seven and eight miles long and has twelve stations. In *Pravda* particular emphasis is laid on the ventilation, and it it claimed that, whereas in the London "Underground" the air is changed five times hourly, in Moscow's it will be changed eight times.

South Africa.—Railway Electrification.—The railway estimates show that for the electrification of the Rand railway area, which is to cost about £2,000,000, the actual cost of electrifying the lines is £274,000, of which £200,000 will be spent this year. As previously reported, seventy-two motor coaches are to be purchased, £540,000 being set aside for these, and £276,000 is required for the importation and erection of twenty-three electric locomotives. Provision is also made this year for £215,000 for further electrification of the Natal main line.

United States.—New Underground Railway for New York.—The construction of a new underground railway for New York at a cost of approximately £10,000,000 has been announced by the Mayor. According to *Reuter* the line, which will run underneath Sixth Avenue, will form a link in the line already owned by the City, between Eighth Street and 59th Street on Manhattan Island. Construction is to start in about a month, and the line will be completed in three years, after which the existing elevated railway which runs along Sixth Avenue will be demolished. Suggestions that all the elevated railways should be pulled down to make way for underground lines, however, are now less frequent. A number of traffic experts have strongly advocated their retention with a view to their being used in the future as elevated motor highways.

World Railway Electrification.—Miles of Line Converted.—Steam railways which have been electrified throughout the world now amount to 15,200 route miles (about 24,000 track miles). D.c. systems account for 8,000 route miles and a.c. lines for 7,200 miles. The United States leads with 2,260 miles, and is followed by Switzerland (1,862), France (1,570), and Italy (1,558).

York.—Trams to be Superseded.—The Transport Committee has announced its decision to purchase twenty-eight buses which will be used to replace trams as soon as possible.

Communications

Germany.—Television.—A public televiewing room was opened on Sunday in the Berlin Post Office buildings for the first regular television service over a distance of more than ten miles. The transmission was broadcast by Witzleben thirteen miles away, direct television being used instead of films.

Glasgow.—New B.B.C. Premises.—The establishment of new studios and auxiliary offices in Glasgow by the British Broadcasting Corporation is being considered, and it is understood that negotiations are proceeding with a view to the acquisition of a site in the west end of the city. The sum of £50,000 is mentioned as the estimated cost of the building, apart from the purchase price of the site. There is a possibility that television may be operated from the new studio.

Great Britain.—Empire Broadcasting Service.—In view of the success achieved by the Empire Service the B.B.C. has decided to extend the station at Daventry by the addition of two short-wave transmitters, which will be of higher power than those now in use. There will also be extensions to the aerial system, based on the data collected in the experimental work which has been carried out at Daventry during the past two and a half years. When the new transmitters are in operation the two existing transmitters will be combined to form one of higher power.

Wireless Licences.—The number of licences in force at the end of April was 7,055,464, as compared with 6,310,939 at the corresponding date last year. During the month 448,690 were issued.

Ultra-short-wave Transmissions.—Experiments are to be conducted shortly from the roof of the *Daily Telegraph* building in Fleet Street with a view to setting up a new record for distant reception on five metres. Hitherto the maximum range of this wave-length established in ideal conditions has been about 100 miles, while the range of the new London high-definition television station, which will use a wave-length of this order, is estimated at only 25 miles. The tests are being arranged by the London Chapter of the International Short Wave Club, which has a membership in ninety-two countries, and they will begin on May 19th, when a portable transmitter using the call-sign of G5KA, will send out broadcasts in morse and telephony.

Russia.—Broadcasting.—According to the reports presented at the Moscow conference of the U.S.S.R. Radio Committees there are now 26,000,000 listeners, served by sixty-six broadcasting stations. Last year 140,000 hours of transmission were given in sixty-two different languages.

Stornoway.—Proposed Wireless Station.—The Town Council is asking the Postmaster-General to re-establish a wireless station at Stornoway, which was a wireless base during the war, the masts being still in existence.

United States.—Television.—At the annual meeting of the Radio Corporation, according to the *Daily Telegraph*, Mr. David Sarnoff, the president, told stockholders that his company had decided to spend £200,000 "to take television out of the laboratory." A three-point programme has been determined, as follows:—(i) The construction of the first modern television plant in the United States; (ii) The manufacture of a limited number of television sets to be placed at strategic places; and (iii) The development of a programme service with the necessary studio technique to determine the most acceptable form of television programmes. The experiments are expected to continue for at least fifteen months.

World Broadcasting.—I.B.O. Figures.—It is reported by *Reuter* from Geneva that there were approximately 48,300,000 wireless receiving sets in use throughout the world at the end of 1934, according to the International Broadcasting Office. These sets, it is calculated, represent a total of 193,000,000 possible listeners. The greatest number of sets in one country is 20,750,000 in the United States, the second being in Great Britain, (6,780,569), and the third in Germany (6,142,921). The number of sets in Europe is about 23,500,000, and the highest definitely established number of listeners in relation to the population is in Denmark where there are 160 receiving sets for each 1,000 of the population. The number of additional wireless sets put into use during 1934 was approximately 3,500,000, apart from 2,000,000 sets fitted in motor cars in the United States.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Aberdeen.—May 20th. County Council. Electric lighting and heating at Culter H.G. school. Schedules from, and tenders to, G. Watt, architect, 214, Union Street.

Bedford.—May 30th. Electricity Department. Electric water heaters, cooker control units, meter boards, cable covers and cut-outs for the year ending September 30th, 1936. (See this issue.)

Belfast.—May 20th. Electricity Department. Boiler feed pump, air ejector and alterations to extraction pumps and pipework, steam, condensate and feed piping and valves. (May 10th.)

Beverley.—June 7th. East Riding and York Joint Board for the Mentally Defective. Various works, including heating and electric lighting, at three pavilions and alterations to buildings at Brandesburton Hall. Specifications, &c., from the County Hall by May 24th (deposit £3 3s. in each case).

Birmingham.—May 31st. Electric Supply Department. Motor convertors. (May 10th.)
June 14th. E.h.p. and l.p. cables. (See this issue.)

Boston.—May 22nd. Corporation. Three electrically driven borehole pumps with switchgear, sand pumping equipment, crane, lighting and heating apparatus, venturi meter, &c. Specifications, &c., from, and tenders to, R. Walsh, town clerk, Municipal Buildings (deposit £3).

Brighton.—May 27th. Corporation. Two 11,000-kVA and two 6,000-kVA transformers. (See this issue.)

Buckingham.—May 31st. Corporation. Two electrically driven well pumps. Particulars from Chatterton & Alford, 11, Victoria Street, S.W.1.

Chester-le-Street.—May 20th. U.D.C. Various materials, including electrical, for 105 houses. Particulars from W. Ridley, Council surveyor, Council Chambers; tenders to the clerk to the Council.

Chile.—SANTIAGO.—June 24th. Ministry of National Defence. Electric travelling portal cranes for the Port of Iquique. (A.Y. 13067.)*

Colchester.—June 1st. Education Committee. Electrical installation at Old Heath Council school. Specifications, &c., from the Education Office, 3, Trinity Street (deposit £1).

Dagenham.—May 31st. Engineer and Surveyor's Department. Electrical installation in 167 houses. (See this issue.)

Dartford.—May 25th. Corporation. L.p. cable and joint boxes. (See this issue.)

Dundee.—May 20th. Institute of Art and Technology. Various works, including electrical and heating, at extensions of premises in Bell Street. Schedules, &c., from R. Gibson, architect, 2, India Buildings; tenders to the clerk and treasurer.

Dunfermline.—May 24th. Town Council. Electric lighting at 140 houses at Brucefield. Schedules from D. H. Shaw, burgh engineer (deposit £1 1s.); tenders to town clerk.

East Retford.—May 20th. Electricity Department. 11,000-V and 400/230-V overhead distribution lines and transformers. (May 3rd.)

Egypt.—CAIRO.—July 18th. Ministry of the Interior. Substation equipment, transmission lines, telephone lines, cables, distribution pillars, transformers, &c. (A.Y. 13059.)*

Exeter.—May 30th. Electricity Department. Meters. (May 10th.)

Hawarden.—May 29th. R.D.C. 3,000 yds. of 11-kV overhead line, 2,250 yds. of 11-kV insulated cables, 3,000 yds. of l.p. overhead line, 150 yds. of l.p. insulated cable, two pole transformer sub-stations, and three 11-kV pole mounted switches. (May 10th.)

Irish Free State.—CASTLEBAR.—May 27th. Mental Hospital Committee. Electrical installation at the mental hospital. Particulars from P. J. Munden, architect, 1, South Frederick Street, Dublin (deposit £15 15s.); tenders to the resident medical superintendent.

Lincoln.—June 7th. Electricity Department. One 13-panel 250,000-kVA control board. (See this issue.)

Liverpool.—May 29th. Electric Supply Department. H.p. and l.p. switchgear for sub-stations for two years. (May 10th.)

London.—STEPNEY.—May 30th. Electricity Supply Undertaking. Meters, demand indicators, conduits, troughs, covers and lamps as required from July 1st, 1935, to June 30th, 1936. (May 3rd.)
BETHNAL GREEN.—May 21st. Borough Council. Rising mains at tenement dwellings. (May 3rd.)

Lowestoft.—May 27th. Electricity Department. One 1,500-kVA transformer. (See this issue.)

Manchester.—Electricity Committee. May 25th. 420-V three-phase a.c. house-service switchgear. (May 10th.)
May 29th. Weldless steel lamp columns and fittings. (See this issue.)

Morecambe & Heysham.—May 31st. Public Lighting Department. Steel poles, centre suspension units, lanterns, &c. (See this issue.)

Musselburgh.—May 20th. Town Council. Various works, including electrical, at fifty houses. Schedules from burgh surveyor (deposit £1 1s.); tenders to town clerk.

Neath.—May 31st. Electricity Department. Equipment of a sub-station at Resolven. (See this issue.)

Newcastle-upon-Tyne.—May 28th. Aerodrome Committee. Lighting equipment for Woolsington Aerodrome. (See this issue.)

New Zealand.—WELLINGTON.—July 1st. 5,000 metal cased condensers. (A.Y. 13058.)*
July 9th. 2,500 cord connection strips for telephone instruments. (A.Y. 13061.)*
Public Works Department. August 13th. 11,000-V indoor switchgear and control equipment for the Arapuni power development. (A.Y. 13030.)*

Nottingham.—June 4th. Electricity Committee. General stores for one year from July 1st next. (See this issue.)

Oldham.—June 1st. Electricity Committee. Transformers.

Pittenweem (FIFE).—May 31st. Town Council. Electrical work at fifty-six houses. Schedules from MacLennan & Cunningham, architects, 10, Alexandra Place, St. Andrews (deposit £1); tenders to joint town clerks.

Salford.—May 23rd. Electricity Department. 33-kV and l.p. pilot cable. (May 10th.)

Southampton.—May 28th. Electricity Department. Piping and plant for connecting up three boilers and two steam turbines, &c. (May 3rd.) Three-phase transformers and meters. (See this issue.)

Stranraer.—May 20th. Town Council. Electrical fittings at 154 houses. Specifications from A. MacLean Goudie, architect, 30, Lochryan Street (deposit £1); tenders to town clerk.

Suffolk.—East and West Suffolk Joint Committee for the Care of the Mentally Defective. Electrical work at Kedington Institution, near Haverhill. (See this issue.)

Sunderland.—May 20th. Electricity Department. Thermal storage heating installation at the electricity undertaking's Sales Department. (May 3rd.)

Watford.—June 12th. Electricity Department. E.h.p. and l.p. cables for the year ending June 30th, 1936. (May 10th.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, London, S.W.1.

Contracts Closed

Australia. — COMMONWEALTH. — P.M.G.'s Department. Accepted. Copper wire.—British Insulated Cables, Ltd.; Metal manufacturers Pty., Ltd. Submarine cable.—Siemens (Aust.) Pty., Ltd. (£1,430); Lawrence & Hansen Electrical Co., Ltd. (£207). Switchboard keys and parts (£2,105).—Ericsson Telephone Manuacturing Co. Bells and buzzers.—Standard Telephones & Cables (A'sia), Ltd. (£602); Ericsson Telephone Manufacturing Co. (£533). Resistances reactances and coils.—Automatic Telephones, Ltd.; Standard Telephones & Cables (A'sia), Ltd. Carrier telephone equipment.—Standard Telephones & Cables (A'sia), Ltd.; British General Electric Co., Ltd.
Department of Defence. Accepted. Submarine cable.—British Insulated Cables, Ltd. Reflectors.—British General Electric Co., Ltd.
MELBOURNE.—Metropolitan Board of Works. Accepted. Trolley wire (£2,018).—British Insulated Cables, Ltd.
SYDNEY.—Municipal Council. Accepted. Alterations to h.v. switchgear (£1,234) and supply of l.v. m.c. switchgear (£1,644) —A. Reyrolle & Co. Supervisory control equipment for 33,000-V sub-station (£3,182).—Automatic Telephone Co.

Cardiff.—Electricity Committee. Accepted. Transformers.—Electric Construction Co., Ltd. (£2,285); English Electric Co., Ltd. (£1,969).

Chesterfield.—Electricity Committee. Accepted. Cables (£605).—Macintosh Cable Co., Ltd. Rectifier equipment (£2,575). —Hewittic Electric Co., Ltd.

Douglas (I.O.M.).—Electricity Committee. Accepted. Switchgear (£761).—New Switchgear Construction Co., Ltd.

Hastings.—Electricity Committee. Recommended. Supplies for twelve months: Electric cookers.—Jackson Electric Stove Co., Ltd.; Revo Electric Co., Ltd. Cables.—W. T. Glover & Co., Ltd. (£4,863); Metropolitan Electric Cable and Construction Co., Ltd. (£291); Crompton Parkinson, Ltd. (£600).

Ilford.—Electricity Committee. Recommended. Switchboard (£9,835).—Crompton Parkinson, Ltd.

Kesteven.—Public Assistance Committee. Accepted. Electric lighting at Sleaford Institution (£983).—W. J. Furse & Co.

Plymouth.—Electricity Committee. Accepted. Equipment, &c., required for the change-over from d.c. to a.c.—R. C. A. Photophone, Ltd. (£104); Sweetland Organ Co. (£68); Evans Lift Co. (£74); Hobart Manufacturing Co. (£262); Express Lift Co. (£300).

Rugby.—Warwickshire Standing Joint Committee. Recommended. Electric lighting at divisional police quarters (£400). —B. French, Ltd.

Scarborough.—Town Council. Accepted. Electric lighting installation and fittings on housing estates: 208 houses on the Northstead estate.—Bowie Electrical Service; 110 houses on the Prospect Mount estate.—Watson & O'Connor, Ltd.

Warrington.—Electricity Committee. Accepted. Transformers for twelve months.—Electric Construction Co., Ltd.

West Hartlepool.—Electricity Committee. Accepted. 7,000 prepayment slot meter locks.—J. Hardy & Son, Ltd.

Workington.—Electricity Committee. Recommended. Kiosk switchgear.—Crompton Parkinson, Ltd.

Worthing.—Electricity Committee. Accepted. Cables for twelve months.—Enfield Cable Works, Ltd.; Derby Cables, Ltd.

Notes

Stepney Power Station Emissions

The Housing and Public Health Committee of the London County Council reported to the Council on Tuesday that complaints continue to be received regarding the emission of smoke and grit from the Limehouse generating station of the Stepney Borough Council. The matter was raised in 1920 when a local trader secured an injunction to restrain the Council from allowing the nuisance to continue. Steps were taken to abate the nuisance but further complaints were received in 1933. In April last year tests were made at one of the three shafts which, "it was understood," emitted the products of combustion from three furnaces burning pulverised fuel. The L.C.C. chemist reported that the stack under normal conditions was discharging, on the basis of a three-minute test, nearly 4 cwt. of grit in 24 hours. "The grit was typical of pulverised fuel furnaces not very efficiently worked, as it contained 28 per cent. of unburned matter." The Borough Council was informed that if active measures were not taken to abate the nuisance steps would be taken to institute legal proceedings; a copy of the letter was sent to the Electricity Commissioners. Arrangements were later made for an "admitted expert" to visit the station. His report confirmed the conclusions of the Council's officers. The Minister of Health arranged a conference of the parties concerned in September last at which the Borough Council put forward proposals to deal temporarily and (within twelve months) permanently with the trouble. The temporary measures consisted of running the plant in a manner calculated to lessen the emission and to use coal of a lower ash content. The permanent measures provided for the erection of a chimney to deal with the emissions from the three p.f. boilers and the installation of a film-washer or electrostatic extraction plant. The temporary measures, states the Committee, have proved to be ineffective; in fact the deposits have been heavier. The Committee has been informed that the Borough Council has not yet been able to acquire the necessary land for the proposed new chimney and so nothing has been done with regard to the permanent arrangements for reducing the emissions. The Committee accordingly recommended that, subject to the sanction of the Minister of Health, police court proceedings should be taken against the Borough Council. The recommendation was approved.

Charge Against Scottish Engineers

Geoffrey Victor Vaughan, assistant electrical engineer, employed by the Electricity Committee of the Stewartry County Council, and Alexander Dobie, electrical foreman, appeared at Dumfries Sheriff Court on May 10th on an indictment at the instance of the Lord Advocate under which they were charged that, while acting in concert, on January 31st, 1934, at the electricity generating station at Barrhill, Dalbeattie, they unlawfully and maliciously cut or injured an electric line, the property of the County Council, with intent to cut off the supply of electricity from the central district of the burgh of Dalbeattie, whereby the supply of electricity was cut off from a number of street lamps and from about 400 houses and business premises. In each case a plea of "Not guilty" was tendered. Sheriff Johnston intimated that the trial would take place at Dumfries on May 22nd. Bail was continued.

The Generation of Electricity in April

The official returns rendered to the Electricity Commissioners show that 1,330 million kWh of electricity was generated by authorised undertakers in Great Britain during April, as compared with the revised figure of 1,188 million kWh in the corresponding month of 1934, representing an increase of 142 million kWh, or 11.9 per cent. The number of working days in the month (*i.e.*, excluding Sundays and Bank Holidays) was twenty-four, the same as last year.

During the first four months of 1935 up to the end of April the total amount of electricity generated by authorised undertakers was 6,029 million kWh as compared with the revised figure of 5,458 million kWh for the corresponding period of 1934, representing an increase of 571 million kWh, or 10.5 per cent. The figures for the first four months of the year are given below:—

	1934. kWh. (millions)	1935. kWh. (millions).	Increase per cent.
January ...	1,536	1,714	11.6
February ...	1,343	1,478	10.0
March	1,391	1,507	8.3
April	1,188	1,330	11.9

Associate Membership of the A.S.E.E.

The Association of Supervising Electrical Engineers has established a new grade of membership—Associate membership—for those "engaged in the distribution, installation, utilisation, and/or selling of electricity and/or electrical apparatus, and whose experience and duties of employment involve technical and/or commercial duties." The annual subscription will be £2 2s. per annum and the entrance fee 10s. Further particulars may be had on application to the General Secretary, A.S.E.E., Aldwych House, Aldwych, W.C.2.

Appointments Vacant

Switchboard supervisor for Edinburgh Electricity Dept.

Temporary engineering clerk of works for Middlesex County Council.

Foremen of trades (electrical and mechanical) for Royal Air Force stations.

Full-time graduate assistant master in electrical engineering and mathematics at Paddington Technical Institute for the L.C.C.

Test-room supervisor for Hull Electricity Department.

Shift engineer for the Central Argentine Railway.

(See our classified advertisements.)

Forthcoming Events

Institution of Electrical Engineers (*London Students' Section*).—Friday, May 17th. Institution, London. 7 p.m. Annual general meeting. (*Western Centre*).—Friday, May 17th to Monday, May 20th. Hotel Metropole, Minehead. Summer meeting. (*South Midland Students' Section*).—Saturday, May 18th. 1.45 p.m. Visit to the Ironbridge power station, Shropshire. Saturday, May 25th. Visit to the British Industries Fair, Castle Bromwich. (*Wireless Section*).—Saturday, May 25th. 9.30 a.m. Visit to the wireless stations at Ongar and Brentwood of Cable and Wireless, Ltd. (*South Midland Centre*).—Wednesday, May 22nd. Visit to the Droitwich broadcasting station.

Royal Institution.—Friday, May 17th. Institution, London. 8.30. p.m. Conversazione.

British Industries Fair.—May 20th-31st. Castle Bromwich, Birmingham.

National Electrical Convention.—June 3rd-7th. Bournemouth.

Makers' Names Wanted

IMPERIAL vacuum cleaner.

Progress of the Galloway Scheme

WITH the recent flooding of the Tongland dam the first stage of the Galloway power scheme, consisting of the two power stations at Glenlee and Tongland, near Kirkcudbright, nears completion.

The second stage involves the construction of further stations at Earlstoun, Carsfad and Kendoon, the contract for the equipment of which has been awarded to Messrs. Glenfield and Kennedy, Ltd., the consulting engineers being Sir Alexander Gibb & Partners. This equipment, which will be ready before the end of the year, includes that for the Ness Glen dam at the outlet of Loch Doon, where the level of the water is to be raised by 25 ft., and regulated by three sets of syphon pipes. The dam will have two outlets, one above the other. The lower one will be controlled by a sluice gate, the upper one having a regulating needle valve and jet disperser.

A bulkhead gate for either outlet will be constructed on the up-stream side of the dam to allow inspection and maintenance work. From Loch Doon to Carsphairn Lane there is to be constructed a tunnel along which the water of the loch will flow to the reservoir feeding Kendoon power station. The water will be controlled by an intake tower equipped with a large sluice gate and a screen. The four turbine intake gates for Carsfad and Earlstoun power stations will each have a ten-foot span and will be 14 ft. high. A break in the pipes leading to the turbines would automatically close the gates. Two other sluice gates will be built at the Earlstoun dam.

Glenlee power station has been delivering electricity to the grid for some weeks, and next month Tongland station will also be ready. The total scheme is for some 140,000 h.p. of which 75,000 h.p. is in stage one, but the whole of the latter will not be available until stage two is completed.

The dam at Tongland is about three-quarters of a mile above the station and the barrage at Glenlochar, which controls the water at Loch Ken. From this dam the water is led to the power station by a 20-ft. diameter pipe. The dam has raised the level of the water about 70 ft. above the old river level to give three hours' storage at full load. The barrage at Glenlochar enables Loch Ken to be used as a reservoir for feeding the Tongland dam.

The catchment area lies mainly in Kirkcudbrightshire, but includes a small portion of Ayrshire. It is about 35 miles long by 19 miles at the widest point. At its southern end it reaches almost to the sea at Kirkcudbright, while its northern end reaches up to the top of the hills to the south and east of Dalmellington. The major portion of the catchment area is drained by the Dee and the Water of Ken, with their tributaries. A subsidiary but important part of the catchment area includes the headwaters of the River Doon, which are collected in Loch Doon and diverted by a tunnel to the neighbouring watershed of the Dee for use in the power scheme.

The first stage is concerned with the development of power from the river Dee, and the second, in the main, with the corresponding development of the potential water power of the Water of Ken, with a contribution from Loch Doon, while Clatteringshaws dam has created a great storage reservoir.

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

Mr. W. M. Horsfall, M.I.E.E., who has retired owing to ill-health after nearly nineteen years with the Edison Swan Electric Co., Ltd., at the company's Liverpool branch, was recently entertained to dinner, and was presented with an inscribed gold wrist watch by his Liverpool colleagues. Mr. Horsfall was educated at Repton School, and in 1894 joined the staff of the Liverpool Electric Supply Co., Ltd. Two years later he was appointed engineer and manager of the Liverpool & District Lighting Co., Ltd., and supervised the erection of the generating stations at Waterloo and Gateacre. He resigned this position in 1910 to take up consulting work. In September, 1916, he joined the Liverpool depôt of the Edison Swan Electric Co., Ltd., as chief outside representative under Mr. C. H. Cox, who was at that time the district superintendent. He became a member of the Institution of Electrical Engineers in 1904, and for three years served on the committee of the Liverpool and Merseyside Centre.

Mr. W. H. Horsfall

Mr. A. W. Money, resident electrical engineer to the Chiswick Electric Supply Corporation, Ltd., whose Chiswick undertaking has been taken over by the local Town Council, has been appointed electrical engineer to the Council at his present salary of £1,200 in accordance with the heads of agreement between the two parties.

It seems that the U.S. Department of Justice has no intention of dropping the prosecution of **Mr. Samuel Insull,** who is charged with the violation of criminal provisions of the Bankruptcy Act. The *Electrical World*, in referring to the matter, says it is also stated by departmental officials that attempts will be made to locate Martin Insull and return him to the States for further trial with his brother on the bankruptcy charges.

Mr. R. A. Watson Watt, B.Sc. (Eng.), of the National Physical Laboratory, has been nominated chairman of the Wireless Section of the Institution of Electrical Engineers for the session 1935-36.

Mr. W. Cook, assistant secretary to the Electricity Commissioners, retired on May 11th, under the age limit, after fifteen years' service with the Electricity Commission. Mr. Cook has a record of forty-two years' public service in all, having served with the London County Council for twenty-seven years before transferring to the Electricity Commission on its establishment in 1920.

[*Cradley, Cardiff.*

Mr. E. Jones

Mr. E. Jones, mains superintendent to the Cardiff Corporation, has now been appointed city electrical engineer in succession to **Mr. C. G. Morley New,** who will take up his duties as an Electricity Commissioner on July 8th. Mr. Jones received his early training with the Cardiff Corporation under Mr. Arthur Ellis, and spent three years as a seagoing engineer and on heavy colliery installations. He was appointed deputy mains engineer at Cardiff in 1913, and became mains engineer in 1928. He is an associate member of the Institution of Electrical engineers and has served during the past three years on the Committee of the Western Centre.

Mr. W. Redshaw, engineer to the Weardale Steel, Coal & Coke Co., Ltd., has been appointed by the Crook Urban District Council (Co. Durham) as electrical engineer in succession to Mr. J. S. Forster, who has taken up an appointment with the Seaham Urban District Council.

Mr. Phillip Sheridan, joint managing director of the Strand Electric and Engineering Co., Ltd., and a director of Strand and Interchangeable Signs, Ltd., is leaving by the *Britannic* on June 15th on a visit to the U.S.A. and Canada in connection with lighting problems and illuminated publicity.

Mr. J. W. Mayall, of Messrs. Mayall & Co., Ltd., Birmingham, was recently elected president of the Electrical Wholesalers' Federation. Mr. Mayall was educated at Houldsworth School, Reddich, and the Stockport Technical School. He commenced his business career with the Manchester Ship Canal Co. From there he went to Messrs. E. Green & Sons, Ltd., economiser manufacturers, Wakefield, and later joined the staff of the A.E.G., Berlin. In 1913 he was transferred from Germany to manage the Birmingham branch of the company. On the outbreak of war, he commenced business on his own account, and subsequently served in the R.F.C., being later transferred to the Intelligence Department, on H.Q. staff, R.A.F., Italy.

[*H. J. Whitlock & Sons, Ltd.*

Mr. J. W. Mayall

Mr. W. Davies, charge engineer to the Tredegar Urban District Council, has been appointed deputy electrical engineer to the Council.

Mr. D. P. Morrison, general manager of the Hull Corporation Transport Department, has been selected for the post of general manager of the Bournemouth Corporation Transport Department in succession to **Mr. I. Bulfin,** who is retiring shortly.

Mr. J. F. Bishop, of the Warrington Corporation Electricity Department, has been recommended for the post of chief assistant engineer in succession to the late Mr. H. B. Jackson. It is also proposed to appoint **Mr. R. L. Edgar** as mains engineer, and **Mr. W. R. Bland** as assistant mains engineer.

Mr. A. W. Makovski, of Tamplin & Makovski, Ltd., electrical engineers, of Reigate and London, has been re-elected president of the Reigate & Redhill Chamber of Commerce.

Mr. A. Hewitt, who has been chairman of the North Wales & South Cheshire Joint Electricity Authority since its inception, has been re-elected for a further period of three years.

Obituary

Mr. H. J. Oldridge.—The death took place on May 6th, after an operation, of Mr. H. J. Oldridge, director of Messrs. C. Oldridge & Sons, Ltd., electrical engineers, Kingston-on-Thames.

Mr. J. E. Storr.—We regret to record the death on May 9th of Mr. John Edwin Storr, of Lindum, Roundhay, Leeds, who since 1922 had been practising as a consulting and mechanical engineer, and had carried out important contracts for municipal, industrial and private concerns. Mr. Storr received his training with Messrs. Robey and Co., of Lincoln, and at the Corporation electricity works at Lincoln and Croydon. He became a constructional engineer for Callender's Cable & Construction Co., Ltd., and carried out contracts for that company in London and various parts of England, and in Germany. After a period with the Bolton Corporation during which he was engaged on constructional work he joined the staff of the Yorkshire Electric Power Co., with whom he remained until 1922 when he started in private practice. He was a member of the Institution of Mechanical Engineers, a past chairman of the North

[*Elliott & Fry.*

The late Mr. J. E. Storr

Midland Centre of the Institution of Electrical Engineers, and a prominent Freemason.

Mr. A. D. Stevenson, who was for many years a director of the British General Electric Co., Ltd., in Australia, and a member of the Wiring Rules Committee of the Standards Association of Australia, has died at Sydney, at the age of seventy. His early days were spent in Egypt, where his father was assistant superintendent of the Eastern Cable Co. After gaining experience in electrical engineering in England and South Africa, Mr. Stevenson joined the staff of the General Electric Co., Ltd., and was transferred to the Sydney branch as chief engineer. He retired seven years ago.

Will.—Mr. J. A. Edmondson, M.I.E.E., of Whimple, Devon, left £81,805, with net personalty £77,743. He left the residue of the property, after a life interest, to be divided into 100 parts, of which seven are for the Benevolent Fund of the Institution of Electrical Engineers and seven for the Benevolent Fund of the Institution of Civil Engineers.

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Debenture Charges, Reports of Electrical Companies,

New Companies Registered

Thermocontrol Installations Co., Ltd.—Private company. Registered May 7th. Capital, £2,000 in £1 shares. Objects: To install apparatus and appliances for the measuring, recording and automatic control of temperature, pressure and humidity for all purposes, and to carry on the business of mechanical and electrical engineers, &c. The subscribers are: C. R. H. Howell, 8, Staple Inn, W.C.1; and C. T. R. Llewellyn, 15, Bedford Row, W.C.1, solicitor. Secretary: C. R. H. Howell. Registered office: 8, Staple Inn, W.C.1.

Transport and General Neon, Ltd.—Private company. Registered May 7th. Capital, £1,000 in £1 shares. Objects: To carry on the business of sign manufacturers and luminous tube manufacturers, &c. The permanent directors are: M. Botibol (chairman), 3, Woburn Square, W.C.1; and F. Lantree, 112, Ritherdon Road, S.W.17. Registered office: 12, Percy Street, Tottenham Court Road, W.1.

Atkins Electrical Appliances, Ltd.—Private company. Registered May 8th. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in complete electrical articles, component parts, and television and wireless apparatus, and electrical goods of all descriptions, motor cars and cycles, &c. The first directors are: H. S. Atkins, 51, Stratford Street, Camp Hill, Birmingham; and H. R. Garner, 100, Sherlock Street, Birmingham. Registered office: 137, Suffolk Street, Birmingham.

Cressall Manufacturing Co., Ltd.—Private company. Registered May 10th. Capital, £15,000 in £1 shares. Objects: To acquire the business of a manufacturer of electrical resistances and resistance materials and electrical control gear now carried on by H. H. Cressall at the Eclipse Works, Tower Street, Birmingham, as the Cressall Manufacturing Co. The subscribers are: H. H. Cressall, Old Rectory Lane, Alvechurch, near Birmingham; and E. A. Norton, 4, Bennetts Hill, Birmingham. Solicitors: Wragge & Co., Birmingham.

Bridge (Croydon) Radio & Engineering Co., Ltd.—Private company. Registered May 4th. Capital, £200 in £1 shares. Objects: To acquire the business of radio and general electrical dealers carried on by H. Lockhart and Eric V. H. M. Roome at 19c, Pitlake Bridge, Croydon. The first directors are: E. V. H. H. Roome, 39, Haling Park Road, South Croydon; and G. F. Lockhart, "Woodroyd," Warren Road, Putney. Registered office: 19c, Pitlake Bridge, Croydon.

Evans & Wheeler (Electrical Engineers), Ltd.—Private company. Registered May 10th. Capital, £600 in £1 shares. Objects: To acquire the business of automobile electrical engineers carried on by S. Evans, G. P. S. Evans and R. V. Evans at 77, Market Street, Birkenhead. The subscribers are: S. Evans, 42, The Promenade, Hoylake, and two others. Solicitors: G. F. Lees & Son, 44/5, Hamilton Square, Birkenhead.

Returns of Electrical Companies

Cape Electric Tramways, Ltd.—Particulars have been filed of debentures created outside the United Kingdom to secure £200,000 authorised March 12th, 1935, and covered by trust deed dated April 3rd, 1935, the whole amount being now issued. Trustees: Syfret's Trust Company, Ltd.

Northern Auto Electric Services, Ltd.—Satisfaction in full on April 26th, 1935, of debenture dated May 13th, 1924, and registered May 17th, 1924. (According to the register of mortgages, the debenture registered May 17th, 1924, originally secured all moneys due to bank.) Debenture dated April 16th, 1935, to secure £1,500, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: W. Ramsden, Bentleys, Allanson Road, Rhos-on-Sea.

Neon Manufacturers, Ltd.—Further charge, dated April 18th, 1935, to secure £400 (supplemental to mortgage debentures dated February 15th, 1935, and further charges dated March 18th, 1935, and April 5th, 1935). Property charged: The contracts and all other premises comprised in the original deeds. Holders: Tudor Investment Trust, Ltd., 84, Temple Chambers, Temple Avenue, E.C.

Downton Electric Light Co., Ltd.—Particulars filed of debentures to secure not more than £2,500 and premium of 2 per cent. authorised March 15th, 1935, charged on the company's property, present and future, including uncalled capital, the amount of the present issue being £2,500.

Dale & Williams, Ltd.—Three debentures dated April 26th, 1935, to secure £130, £115 and £40 respectively, charged on the company's property, present and future, including uncalled capital. Holders: P. J. Williams, "Plaxtol," 1, Bow Arrow Lane, Dartford, and others.

Medway Relay Service, Ltd.—Mortgage on freehold premises in Chatham, dated April 23rd, 1395, to secure all moneys due or to become due from the company to the Midland Bank, Ltd.

City Notes

The British Power & Light Corporation (1929), Ltd., held its annual meeting on May 10th, Mr. C. E. Benson presiding. In presenting the report and accounts (ELEC. REV., May 3rd, p. 651) the chairman said that the holders of the 10s. shares of the North Wales Power Co. accepted in August last the offer to exchange their shares for ordinary shares of the Corporation in the ratio of two shares of the North Wales Power Co. for one Corporation share. The Corporation now held over 99 per cent. of the ordinary shares of the Power Co. The directors considered that it would be in the interests of the group as a whole if the two main operating companies in North Wales, the Power Co. and the Distribution Co., were to be brought into closer co-operation, probably ultimately by a complete physical merger. The Corporation had therefore acquired the entire share capital of the Distribution Co., and to finance this operation an issue of 400,000 preference shares was made. The £1,468,100 4½ per cent. outstanding debentures of the Power Co. had been converted into new debenture stock bearing interest at 3 per cent. At the same time £104,430 debentures of the Distribution Co. and of the East Suffolk Co. were dealt with in a similar manner. A pension scheme for employés was inaugurated on January 1st last. Referring to the operations during the year of their subsidiary companies, Mr. Benson said that the subsidiaries of the North Wales Power Co. continued to make satisfactory progress, particularly as regarded authorised undertakers and miscellaneous consumers. During the year an additional 6,000-kW generating set and a further pipeline were installed at Maentwrog, in accordance with the agreement with the Central Board. The drought which affected the earnings of the North Wales Power Co. so seriously in 1933 continued during the first half of last year, but the water storage began to pick up in the latter half of the year. This year up to date they had had a sufficiency of water, the storage on April 30th being equivalent to a little over 15 million kWh, as compared with 8¾ millions at the same time last year. To ensure, however, that the company would not again suffer to the extent that it had done in the past through water shortage, the North Wales Co. had allocated to a contingency reserve the sum of £25,000. The Distribution Co. had also continued to make steady progress, the number of consumers connected increasing by 30 per cent. during the year, and the sales of electricity by 23.6 per cent. As from April 1st, 1934, the price of electricity for lighting purposes was reduced from 8d. to 7d. per kWh. with the result that despite the increase in kWh sold the revenue was lower by £1,910 than for 1933. The results for the current year should justify the reduction. The other distribution companies had made a profit excepting the Trent Valley Co., which incurred a reduced loss of £872. The current year's progress of the last-named company made it look as if this loss would not occur again. During the past year they had laid 159 miles of mains in the areas which they served through their subsidiary companies. The first quarter of 1935 had shown steady progress in every subsidiary company, and unless a more terrible drought occurred the Corporation should make steady progress. In view of this they hoped later on in the year to be in a position to consider the question of starting interim dividends.

An extraordinary meeting preceded the annual meeting at which resolutions were passed altering the name of the company by eliminating "1929," and converting the preference and ordinary shares into stock.

The East African Power & Lighting Co., Ltd.—Presiding at the annual meeting held on May 13th, Capt. H. F. Ward (chairman) said that in spite of the period of depression they had pursued a steady policy of expansion. Two years ago they acquired, through a subsidiary, a substantial holding in the electricity undertaking of Dar-es-Salaam in Tanganyika, and also the rights of supply in an important area in Tanganyika for which purpose development of a hydro-electric scheme was undertaken at the Pangani Falls and was now in course of construction. The whole of the estimated capital requirements for the development of this territory were provided last year by the issue of ordinary shares. The construction of the Great Pangani Falls station and transmission system was proceeding actively, and Messrs. Balfour, Beatty & Co., Ltd., who were carrying out the work on their behalf, hoped to have the power station and the major portion of the transmission system in commercial operation by the end of the current year. The new station at Dar-es-Salaam continued to give satisfactory results, and the outlook for business was such that further extensions were in progress. Considerable developments had taken place in Kakamega in prospecting and development of gold-mining undertakings, and they were hopeful that the indications of the stability of this new industry would lead to their undertaking the supply of electricity in the area concerned, in respect of which they had a licence to supply. Certain negotiations had taken place, and it was found that in the initial stages certain of the gold-mining properties preferred to introduce their own installations, but they were hopeful that as the business expanded some co-operative scheme of electricity supply might be

evolved to deal with this specialised class of consumer. Similar business had been investigated in Tanganyika Territory, but the same considerations, to some extent, applied there as in Kenya.

The Calcutta Electric Supply Corporation, Ltd., held its annual meeting on May 8th, when Lord Meston (chairman), who presided, said that the company had an almost unbroken record of advance in two directions—in the extension of its services and in the steady reduction of its charges to consumers. They were now embarking upon a programme of some magnitude. In the forefront was a large new power station in the northern area, which was to be erected at Mulajore, just below Bhatpara. When that was in commission Bhatpara would become practically a distributing station. Cossipore would diminish in importance as its plant wore out, and thus the main burden of the load would devolve upon their Southern station and the new station at Mulajore. The next item in the programme was the bringing of all their stations under one central control, feeding into one common pool. The interconnecting system would be laid underground. They were examining carefully what modifications in the industrial tariff were necessary, particularly to meet the demand of the small power consumers. The flat-rate tariff to domestic consumers had been reduced from 2⅔ annas to 2¼ annas per kWh. Considerable new capital would be required for the Mulajore station and for the developments in distribution. A portion of this was obtained on satisfactory terms at the beginning of the year, when they sold a block of 400,000 preference shares at £1 7s. per share. They were now asking authorisation for an increase in the nominal capital from £4,000,000 to £5,000,000. Their relations with the Calcutta Corporation remained friendly, and they were negotiating for a renewal of their contract which expired at the close of 1934. The report and accounts were adopted and a resolution was passed authorising the increase in the nominal capital to £5,000,000.

Ruston & Hornsby, Ltd., propose to reduce their share capital by £820,000 to £1,680,000 by cancelling 8s. per share on each of the 2,050,000 ordinary £1 shares; the 4½ years' arrears of dividends on the 5 per cent. preference shares to June 30th, 1934, and five years' arrears of dividends on the 6 per cent. "B" preference shares to December 31st are to be cancelled. The ordinary shareholders will surrender one-eighth of their holdings of the reduced ordinary shares for rateable distribution among the preference holders. Afterwards the ordinary shares will be consolidated into £1 shares and each class of share will be converted into stock, and subsequently the capital will be restored to its present level of £2,500,000. As part of the general reconstruction it is proposed to write off the debit balance of £74,130 and to reduce considerably the value at which certain assets stand in the company's books. As a result of these measures it should be possible, if earnings continue at their present rate, to bring the payment of the preference dividends up to date during the current year. The volume of business done by the company during the year to March 31st last has shown an improvement over the previous year, and the condition of the order book encourages the directors to hope that this improvement may be maintained. The proposals will be submitted at a meeting to be held on May 31st.

Edmundson's Electricity Corporation, Ltd., reports that after providing for administration and other expenses, income tax, debenture interest, &c., there is a net profit for the year ended March 31st of £458,682, as compared with £402,839 in 1933-34, which with £41,855 brought in makes £500,537. Reserve receives £45,000, and it is proposed to pay a final ordinary dividend of 4½ per cent., making 8 per cent. for the year (against 7 per cent.), leaving £44,577 to be carried forward. Meeting: May 21st. The following table shows investments in subsidiary companies as at March 31st last:—

	Shares.	Debentures.
Beds., Cambs. & Hunts. Elecy. Co.	£282,066	£250,000
Cambridge Electric Supply Co., Ltd.	376,374	—
Cookham and District Electricity Corpn., Ltd.	3,636	—
Ilfracombe E.L. & P. Co., Ltd.	49,756	—
Isle of Wight E.L. & P. Co., Ltd.	382,916	—
Lymington E.L. & P. Co., Ltd.	75,153	—
Melton Mowbray Elec. Light Co., Ltd.	42,680	19,000
Oxford Electric Co., Ltd.	284,515	—
Ramsgate & District E.S. Co., Ltd.	137,619	—
Reading E.S. Co., Ltd. (in liquidation)	88	—
Salisbury Elec. Light & Supply Co., Ltd.	97,029	5,500
S.W. & S. Electric Power Co.	2,864,986	—
Simpson Baker & Co., Ltd.	20,140	—
Thames Valley E.S. Co., Ltd....	3,636	—
Tisbury E.S. Co., Ltd.	2,666	—
Urban Electric Supply Co., Ltd.	1,336,946	—
Wessex Electricity Company	783,666	400,000
Western E.S. Co., Ltd....	428,097	—
Wycombe (Borough) E.L. & P. Co., Ltd.	154,983	33,796
Yeovil E.L. & P. C., Ltd.	56,500	—
	£7,383,452	£708,296

The company reports that the results of the operations of its group of companies during April, as compared with the corresponding month of 1934, show an increase of 14 per cent. in kWh sold.

The Madras Electric Tramways (1904), Ltd., held its annual meeting on May 8th. Mr. J. Gray (chairman), who presided, said that the traffic receipts and passengers carried during 1934 showed decreases of 0.5 per cent. and 1.5 per cent. respectively. The year 1933, however, benefited by a bus strike, so it could be considered that the normal tramway traffic was maintained in 1934. Motor-bus competition continued over a large portion of the tramway system, and the electrified part of the South Indian Railway, which served about three miles of their route, now competed with them. The conversion of their crossbench cars into the corridor type had been completed. At the last meeting it was reported that the Madras Corporation had granted permission to double track section 6, but progress with this had been delayed. In August last, the Corporation further sanctioned the double tracking of certain parts of their system, of which a portion had been completed.

The Ever Ready Co. (Great Britain), Ltd., has now issued its full report. This shows a profit for the year ended March 31st last of £449,579, as compared with £396,923 in 1933-34. A sum of £125,111 is allocated to reserves, and the ordinary dividend for the year is maintained at 35 per cent., the amount carried forward being £56,604, against £49,344 brought in. The report states that four competing businesses were acquired during the year. The factories of one business were closed down, and the other factories had been reorganised and had been working profitably since their acquisition. In part-payment of the purchase price, 155,569 ordinary shares of 5s. each were issued to shareholders of the four companies at the price of 30s. per share, and the resultant total of share premiums, amounting to £194,461, had been utilised to write down the capital value of subsidiary undertakings. In February last a public company was formed in the Irish Free State entitled "Ever Ready (Ireland), Ltd.," Goodwill, trade marks, patents, &c., in Southern Ireland were sold to the new company. It is proposed to convert the share capital into stock. Meeting: June 3rd.

The Telegraph Condenser Co., Ltd.—Presiding at the annual meeting held on May 10th, Mr. S. G. Brown (chairman) said that satisfactory results were disclosed by the accounts. The past year had been a difficult trading period, and competition had been particularly keen. They were indebted for their success to the whole of their organisation and the research department. Their output during 1934 represented not far short of ten million condenser units. The markets in which they sold their products were wide and varied, and the condensers themselves varied from articles weighing a fraction of an ounce to others up to five tons in weight. With regard to the future, the current year had started well, and they had made better progress than they had done this time last year. The increased output had necessitated an extension of their factory and equipment, and these extensions had already commenced.

The St. Austell and District Electric Lighting and Power Co., Ltd., reports a profit for 1934 of £5,547, to which is added £3,288 brought in, making £8,835. It is proposed to pay a final ordinary dividend of 5 per cent., making 10 per cent. for the year, and to carry forward £4,548. The report states that considerable extensions of mains have been made, and the sales of electricity continue to show a substantial increase. An exceptional number of new consumers was connected, many taking advantage of the rental wiring scheme. During the year the assets of the undertaking previously owned by the Mevagissey Electric Supply Co., Ltd., have been acquired.

The Telephone Co. of Pernambuco reports net revenues from operation for 1934 of £9,369, to which is added other net income of £275. After deducting debenture interest there is a loss of £1,908 (against £3,400), to which is added property retirement reserve appropriation, £1,375, making a loss before exchange adjustment carried to deficit of £3,283. The deficit at January 1st, 1934, as adjusted was £18,668, which with the loss for the year and exchange adjustment on working capital, makes a total deficit of £21,789.

The London Electric Wire Co. & Smiths, Ltd., reports a profit for the year ended December 31st last of £76,452, as compared with £65,750 in the preceding year. To this is added £19,628 brought in, and it is proposed to pay a final ordinary dividend of 3¾ per cent., less tax, maintaining the distribution at 5 per cent., less tax, leaving £30,828 to be carried forward. Meeting: May 16th.

The Atlas Electric & General Trust, Ltd., has declared a final dividend of 4 per cent. on the 7 per cent. cumulative preference shares, less tax, making 7 per cent. for the year. The directors state that the amount required for the final dividend has been provided, to some extent, out of the revenue brought forward from the previous year.

The Charing Cross Electricity Supply Co., Ltd.—A dividend of 2½ per cent. on the ordinary shares will be paid by the registrars of London Associated Electricity Undertakings, Ltd. The payment represents £23,465 at the credit of the Charing Cross Co.'s No. 2 reserve.

The Melbourne Electric Supply Co., Ltd., has declared an interim dividend of 2 per cent., tax free, on the £1,200,900 consolidated ordinary stock, which includes the £400,300 bonus stock announced in December last.

The Craigpark Electric Cable Co., Ltd.—The directors state that they are unable to pay the 6 per cent. cumulative preference dividend (dividend paid to September 30th, 1933).

East India Tramways Co. has announced an interim dividend of 4 per cent., tax free, on the ordinary shares.

Siemens Bros. & Co., Ltd., have declared a dividend of 4 per cent. for 1934 (unchanged).

Stocks and Shares

TUESDAY EVENING.

BUSINESS was not long in resuming a normal condition after the Silver Jubilee excitements of the previous week. Stock Exchange markets are healthy, there being a good deal of investment business, while the speculative community is taking a lively interest in the shares of the popular aircraft and aviation companies. The Government is to make a further disclosure of its plans on Wednesday in next week, when the bulls of aircraft shares are hoping to hear definite announcements that will encourage the optimism aroused in connection with shares of the companies engaged in this arm of defence. Civil aviation has received a notable advertisement from the increase in the number of flights which took people over London in aeroplanes to view, from the air, the floodlighting in the streets. One of the companies in our list, the British Aluminium, has come into prominence by reason of the material which it supplies to aeroplane companies, and the shares, which were standing about 30s. a month ago, are now up to 36s. 6d.

Public Boards' Stocks

The abundance of capital which remains available for investment is beginning to find its way into the Stock Exchange

markets. Central Electricity issues are steady. London Passenger Transport 4½ per cent. "A" stock has advanced 2 to 124½. The traffics obtained by the London Transport organisation during the Jubilee celebrations have been colossal. In six days, the Board dealt with 69½ million passengers—a number which seems, even to the Londoner who spent the Jubilee time in town, almost incredible. The earnings of the group during the period will be published to-morrow, Wednesday. That the "C" stock will receive a higher dividend than the previously paid 3 per cent., appears to be already assured. The price remains in the neighbourhood of 100.

Electricity Supply Companies

The advance which electricity consumption has made for some time past is continued according to the latest figures for Great Britain during April last. There was an improvement of nearly 12 per cent. over the number of units sold in April, 1934, and for the first four months of the current year the increase over that of the previous corresponding period came to 10½ per cent. These figures find reflection in the net profits of Edmundson's Electricity Corporation for the year to March 31st last, an advance of £55,800 being reported. The increase in the dividend from 7 per cent. to 8 per cent. has already been announced. Edmundson's is controlled by the Greater London & Counties Trust, and it either directs or has interests in more than fifty electricity supply undertakings, in addition to its business as electrical contractors and engineers. One of the subsidiaries is the Urban Electric Supply Company, whose net profit for the year 1934 is £104,300, being about £7,800 down as compared with 1933. The dividend is maintained at 7 per cent. Edmundson's ordinary are better on the week at 43s. 3d. xd.; the 7 per cent. preference at 35s. 6d. show a gain of 6d. Clyde Valleys strengthened to 42s. 6d. West Gloucestershire ordinary rose 4 points to 97. British Power & Light have improved to 27s. 3d. At the meeting held on Friday last week, the chairman showed that the company is participating in the general advance of the industry. He hinted at the possible payment of interim dividends. In the foreign list, Palestine "A" shares are better at 38s. Tokyo sixes at 86 are a point to the good.

The registrars of London Associated Electricity Undertakings are about to pay 2½ per cent. dividend on Charing Cross Electricity Supply ordinary shares. Dealings have started in the new 3½ per cent. debenture stock of the Charing Cross Company. The price is about ½ premium.

British Electric Traction

British Electric Traction deferred stock is now quoted ex dividend at 975. The dividend of 5 per cent., and the scrip distribution of 10 per cent., are repeated in respect of the past year. The net profit is £37,500 up. The preferred ordinary stock again receives 8 per cent. The price of the latter is 168 xd., at which the yield on the money comes to 4¾ per cent. It is, however, not an easy matter to get the offer of this stock.

Manufacturing Companies

British Aluminium ordinary have been amongst the most active of the shares in this particular section, the demand being stimulated by the company's interest in aircraft and aviation. The price touched 37s. 6d. before reacting to 36s. 6d., leaving it 1s. 6d. higher on the week. Siemens have declared a dividend, making 4 per cent. for the year, the same as that of a year ago. The price of the shares is unchanged at 22s. 6d. British Insulated ordinary are steady at £4. The other high-priced shares in the group maintain their previous strength. Associated Electrical Industries ordinary shares gave way to 26s. upon the execution of a large selling order from America. As soon as this was finished, the price recovered to 27s. 6d., at which the yield on the money comes to £4 7s. 3d. per cent. It will be remembered that the company is about to redeem its debentures out of its own resources. General Electric ordinary are 6d. better at 2¾. Ever Ready ordinary, allowing for deduction of the dividend, have shed about 9d., at 21s. 9d. xd.

Miscellaneous Matters

The Associated Equipment Company has declared a dividend of 5d. net, the same rate as that of a year ago. The price of the shares is 37s., the dividend being in accordance with expectation. A company which is affected by the aviation boomlet is the Birmingham Aluminium Castings, the £1 shares in which have risen several shillings, during the past few days, to the present price of 45s. 9d. Interest in television has subsided to some extent, and prices of Baird shares show little alteration this month. The preferred are quoted at 4s. 7½d., the deferred at 9s. 3d., and the "A" shares at 3¾. Electric and Musical Industries have spurted to 27s. 3d., some of the support coming from America. Broadcast Relay Services are better at 5s. 6d. The company has declared a dividend of 28 per cent. for the year. Telephone Rentals came into request at 10s. 3d. Telephone Properties ordinary shares are 14s., the preference 24s. Telephone Manufacturing put on a few pence at 7s. 1½d. Ericssons touched £6 before reacting a little to 118s. 9d. Preference shares have been in renewed demand. British Insulated sixes are 30s., the 5½ per cents. 27s., Enfield Cables 7½ per cent. preference 35s. 9d. Enfield Rolling Mills ordinary shares at 26s. 6d. are a little better than they have been of late. The iron and steel section is firm. In the rubber market there is more hopefulness than business.

Share List of Electrical Companies

Home Electricity Companies.

	Nom.	Dividend 1933.	Dividend 1934	Price. May 14	Rise or Fall.	Yield. p.c £ s. d.
Bournemouth and Poole	1	15	15	76/3	—	3 18 9
Brompton Ordinary	1	7	7	33/6	—	4 3 7
Charing Cross Ordinary	1	7	7	33/9xd	+6d.	4 3 0
Chelsea	1	7	7	33/6	—	4 3 7
City of London	1	7½	7½	36/-	—	4 3 4
Clyde Valley	1	7	8	42/6	+6d.	3 15 2
County of London	1	10½	10½	57/6	—	3 13 1
Edmundson's 7% Pref.	1	7	7	35/6	+6d.	3 19 0
Elec. Dis. Yorkshire	1	9	9	48/-	—	3 15 0
Elec. Supply Corporation	1	11	11	3⅛	—	3 11 10
Kensington Ordinary	1	7	7	33/6	—	4 3 7
Lancs Light and Power	1	7½	7½	38/-	+6d.	3 19 0
London Electric	1	7	8	37/6	—	3 14 8
Metropolitan	1	10	10	53/6	—	3 14 9
Mid'and Counties	1	7	7	38/-	—	3 13 8
Mid. Elec Power.	1	8	8	38/9	—	4 2 8
North Eastern Electric Ordinary	1	6	6	34/-	—	3 10 8
Do. 7% Pref.	1	7	7	35/-	—	4 0 0
Northampton	1	10	10	55/9	—	3 11 9
Notting Hill 6% Pref.	10	6	6	14½	—	4 2 9
North Met. Elec. Ordinary	1	10	10	62/-	—	3 4 6
Do. do 6% Pref.	1	6	6	31/6	—	3 16 2
St. James and Pall Mall	1	7	8½	33/6	—	4 18 6
Scottish Power	1	8	8	41/9	—	3 16 8
South London	1	7	7	35/6	—	3 17 9
Westminster Ordinary	1	7	7	33/6	—	4 3 7
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	27/6	—	5 9 1
Yorkshire Elec.	1	8	8	44/6	—	3 12 0

Public Boards.

Central Electricity 1950–70	Stock	5	5	115	—	4 7 2
Do 1955–75	,,	5	5	118	—	4 4 9
Do. 1951–73	,,	4½	4½	111	—	4 1 1
Do. 1968–93	,,	—	3½	100	—	3 10 0
London & Home Counties, 1955–75	,,	4½	4½	114	—	3 19 0
London Passenger Transport, A	,,	—	4½	124½	+2	3 11 6
Do. do. B	,,	—	5	128½	+1	3 18 0
Do. do. C	,,	3	—	100	—	3 0 0
West Midlands Joint Elec. 1948–68	,,	—	5	115	—	4 7 0

Telegraph and Telephone.

American Tel. & Tel.	$100	9	9	122½	+6	7 7 0
Anglo-Am. Tel. Pref.	Stock	6	6	115½	—	5 4 0
Do. Def.	,,	1½	1½	25½	—	5 17 8
Cable & Wireless 5½% Pref.	,,	2¾	4½	85	—	4 17 1
Do. A. 7½% Ord.	,,	Nil	Nil	17½	−½	—
Do. B. Ord	,,	Nil	Nil	6	−¼	—
Globe Tel. & Tel. Ord.	10	Nil	2½	13	—	1 18 5
Do. do. Pref	10	6	6	14½	+½	4 4 1
Great Northern Tel.	10	20	20	39½	—	5 1 3
Marconi-Marine	1	10	7½	31/3	—	4 16 0
Oriental Telephone Ord.	1	12	12	3⅛xd	+⅛	*3 12 5

Home and Foreign Trams, etc.

Anglo-Arg. Trams First Pref.	5	Nil	Nil	2/-	—	—
Do. do. 2nd Pref.	5	Nil	Nil	1/6	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	5	—	—
British Electric Traction Df. Ord.	,,	5	5	975xd	—	—
Do. do. Pref. Ord.	,,	8	8	168xd	—	4 15 6
Brazil Traction	100	—	—	9½	+⅛	—
Brit. Columbina Elec. Rly. Pce.	Stock	5	5	92½	—	5 8 1
Mexican Light Common	100	Nil	Nil	4	—	—
Do. 7% Pref.	100	7	7	5½	—	—
Do. 1st Bonds	$500	5	5	39½	—	—
Victoria Falls Ord.	1	15	20	7⅞	+⅛	2 14 6
Yorkshire (West Riding)	1	2½	5	28/9	—	3 9 9

Manufacturing Companies.

Aron Electricity Ord.	1	10	10	66/3	—	3 0 4
Assoc. Elec. Ord.	1	4	6	27/6	+6d.	4 7 3
Do. Prf.	1	8	8	37/-	—	4 6 4
Babcock & Wilcox	1	6	8	43/6	−6d.	3 13 9
British Aluminium Ord.	1	5	7½	36/6	+1/6	4 2 2
British Insulated Ord.	1	5	15	4	—	3 15 0
Brush Ord.	Stock	Nil	Nil	37½	—	—
Callender's	1	15	15	3½	—	4 5 9
Do. 6½% Pref.	1	6½	6½	32/6	—	4 0 0
Crompton Parkinson Ord.	5/-	22	12½	2½	—	1 7 9
Do. 8% Pref.	1	8	8	36/3	—	4 8 5
Edison Swan 1st Pref.	1	7½	7½	27/6	—	5 9 0
Electric Construction	1	Nil	Nil	16/3	—	—
Enfield Cable Ord.	1	25	25	4¾	—	5 2 6
English Electric	1	Nil	Nil	9/9	—	—
Do. do. Pref.	1	Nil	Nil	17/-	—	—
Ever Ready	5/-	35	35	21/9xd	−1/9	8 1 0
Ferranti Pref.	1	7	7	28/6	—	4 18 3
G.E.C. Pref.	1	6½	6½	33/9	—	3 17 0
Do. Ord.	1	8	8	52/6	+6d	3 1 0
Henley's	1	30	30	6¾	—	4 7 3
Do. 4½% Pref.	5	4½	4½	5¾	—	3 16 8
India-Rubber Preferred	1	—	5½	1½	—	4 17 9
Johnson & Phillips	1	5	7½	34/6	+2/-	4 7 0
Siemens Ord.	1	6½	4	1½	—	3 11 1
Telegraph Construction	£1	Nil	Nil	1½	—	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parenthesis are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

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19781. "Braun tube more particularly for television purposes." Dr. E. Hudec. July 13th, 1932. (427090.)
22539. "Light valves." Radioakt-Ges. D. S. Loewe. August 12th, 1932. (Cognate application 27230/33.) (427092.)
22540. "Braun tube." Dr. S. Loewe. August 13th, 1932. (427093.)
25247. "Electric signalling cables with air-space insulation." Norddeutsche Seekabel-Werke Akt.-Ges. October 24th, 1932. (Cognate application 25248/33.) (427171.)
25519. "Electrical batteries." P. R. Mallory & Co., Inc. September 17th, 1932. (Cognate applications, 25520/33, 25521/33 and 25522/33.) (427098.)
27540. "Electric lamps." G. V. Downer. October 8th, 1934. (427254.)
27554. "Electric heating devices." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. October 26th, 1932. (427255.)
27953. "Arrangement for the electro-magnetic recording of letter and like signals." Siemens & Halske Akt-Ges. March 24th, 1933. (427257.)
28319. "Electrical apparatus for heating air." G. B. Burnside. October 13th, 1933. (427023.)
28340. "Electro-dynamic phonograph reproducers." Electrical Research Products, Inc. October 28th, 1932. (427024.)
28357. "Control of electrically propelled vehicles." British Thomson-Houston Co., Ltd., and J. H. Cansdale. October 13th, 1933. (427025.)
28435. "Electric clocks." M. P. Favre-Bulle. October 14th, 1933. (427178.)
28467. "Electrical timing arrangements for use with traffic control signals." Automatic Electric Co., Ltd., and T. P. Preist. October 14th, 1933. (427032.)
28590. "Electrical signalling systems." Automatic Electric Co., Ltd., P. J. Robinson and P. N. Roseby. October 16th, 1933. (427109.)
28614. "Illuminating systems comprising metal vapour electric discharge lamps combined with incandescent lamps." British Thomson-Houston Co., Ltd., C. E. Fenwick, L. J. Davies and E. B. Tuppen. October 16th, 1933. (427111.)
28617. "Television and like apparatus." Marconi's Wireless Telegraph Co., Ltd. October 15th, 1932. (Addition to 427113.) (427112.)
28618. "Television, oscillographic, and like apparatus." Marconi's Wireless Telegraph Co., Ltd. October 15th, 1932. (427113.)
28619. "Radio receivers." Marconi's Wireless Telegraph Co., Ltd., and A. A. Linsell. October 16th, 1933. (427114.)
28638. "Electric motor controllers." General Electric Co., Ltd., and C. C. Garrard. October 16th, 1933. (427037.)
28650. "Earth-leakage protective arrangements for electrical apparatus." A. Reyrolle & Co., Ltd., and H. Leyburn. October 17th, 1933. (427183.)
28689. "Resistances with sliding contacts." H. A. Birch. October 17th, 1933. (427038.)
28703. "Electrode holder for use in arc welding." E. J. Clarke and Murex Welding Processes, Ltd. October 17th, 1933. (427184.)
28852. "Wireless direction finders." British Thomson-Houston Co., Ltd. October 26th, 1932. (427039.)
30061. "Electric heaters for bed warmers, pads, carpets, and the like." G. C. Hodges. October 30th, 1933. (427263.)
31636. "Electric flat-iron." A. W. E. Hammerbak. November 13th, 1933. (427046.)
32814. "Electrical signalling systems." Siemens Bros. & Co., Ltd., and A. Rosen. November 23rd, 1933. (427047.)
33055. "Electric tumbler switches." R. H. Baker and C. W. Parsons. November 25th, 1933. (427048.)
35063. "Electric current generators." Record Electrical Co., Ltd., and J. W. Record. December 13th, 1933. (427051.)

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263. "Electric switches for high-tension alternating currents, having liquid breaks." G. Scarpa. January 3rd, 1933. (427052.)
1544. "Modulating system for radio-telephony and the like." K. Schuchter. January 16th, 1933. (427053.)
3765. "Protection devices for electric signalling or like cables." British Thomson-Houston Co., Ltd. February 4th, 1933. (427214.)
5294. "Holder or container for an electric torch, spot-light, or the like." Ever Ready Co. (Great Britain), Ltd., and A. H. Sheppard. February 17th, 1934. (427135.)
6739. "Method and means for controlling gas or vapour electric discharge tubes." L. L. De Kramolin. March 7th, 1933. (427137.)
9549. "Vibration dampers for electrical transmission lines." Aluminium, Ltd. April 10th, 1933. (427225.)
11548. "Sparking plugs for internal-combustion engines." P. L. Alby. March 27th, 1934. (427061.)
17778. "Plug-and-socket connections for electrical machinery such as conveyors and coal-cutting machines." C. Crofton & Co. (Engineers), Ltd., and H. B. Crofton. June 15th, 1934. (427151.)
24805. "Very-short-wave radio receiving arrangements." Telefunken Ges. für Drahtlose Telegraphie. August 29th, 1933. (427074.)
26746. "Electro-pneumatic brake equipment." Westinghouse Brake and Saxby Signal Co., Ltd. May 18th, 1934. (427161.)
28440. "Electric discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. October 19th, 1933. (427282.)
32299. "Electric discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. December 11th, 1933. (427293.)
33495. "Current transformers." British Thomson-Houston Co., Ltd. November 21st, 1933. (427081.)

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1347. "Releasable connection of the electrical conductor of a whale line with a source of current." W. W. Triggs (Aktieselskabet Electrisk Hvalskytning). January 15th, 1935. (427166.)
2729. "Relaxation oscillation generators." Radioakt.-Ges. D. S. Loewe and K. Schlesinger. July 15th, 1932. (Divided out of 19899/33.) (427168.)
7937. "Polyphase electric arc convertors." General Electric Co., Ltd., and H. W. B. Gardiner. October 13th, 1933. (Divided out of 28368/33.) (427086.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from May 8th:—

Teleflex. No. 558786. Class 6. Mechanical appliances for the purpose of controlling by means of push, pull or rotary motion apparatus to be operated at a distance.—M.R.C., Ltd., 9, Cavendish Square, W.1.

Supertax. No. 558433. Class 8. Batteries and accumulators (not for medical purposes).—Price & Co. (Manchester), Ltd., 78, Tib Street, Manchester.

Snail. No. 559340. All goods in Class 8.—Graham Farish, Ltd., 153, Mason's Hill, Bromley, Kent.

Catheon. No. 558924. Class 8. Radio-telephonic and telegraphic apparatus, television apparatus, and parts thereof.—Cath-Odeon, Ltd., Radio Works, Cambridge.

Paraf. No. 556360. Gea (lettering and design). No. 557784. Paraf-Electro (lettering and design). No. 553361. All Class 11. Electrical contrivances (not medicated) for surgical or curative purposes.—"Gea" Gesellschaft für Elektrische Apparate, Ulm-am-Donau, Germany. (British representatives: Hans & Danielsson, 321, St. John Street, E.C.1.)

The Trend of Invention

THE report for 1934 of the Comptroller-General of Patents, Designs and Trade Marks (Stationery Office, 4d. net), shows that during the year 37,409 applications were made for patents, against 36,734 in 1933, while 16,890 patents were sealed, as compared with 16,568. The number of designs registered was 17,830 (against 20,767) and the number of trade marks registered was 5,533 (against 5,472). The surplus on the Patent Office accounts for the year was £212,712, an increase of £38,952 as compared with 1933. In the course of his remarks the Comptroller-General says that invention in the electrical arts is very active. Noteworthy developments are in connection with heavy-current arc rectifiers of the non-mercury type, arc-less switching in high-power switchgear, magnetic cores for high-frequency induction coils, particularly for use in tuning wireless receivers, in which are employed compressed powder cores of low permeability, and permeability tuning units in which the magnetic properties of the cores differ according to the positions of the coil and core. Inventions in connection with electrical discharges through high vacua or gaseous media continue to increase rapidly, a striking example being found in X-ray tubes of hitherto unknown proportions working on voltages of the order of half a million. In the radio art, there is continued activity in connection with superheterodyne receiving sets and in sets using automatic volume control. In electrical impedance networks for filtering and other purposes, the mathematical technique is being developed in such a manner as to enable problems of increasing generality to be solved by systematic methods. The prospect of commercial broadcast television has made cathode ray tubes the focus of much invention and is leading to the development of amplifiers suitable for handling a wide range of frequencies and to the use of special oscillators for producing deflecting potentials of saw-tooth wave form. Advance has also been made in the use of intermediate film transmitters to overcome difficulties where a scene cannot be strongly illuminated. The progress made in short-wave transmission and reception, apart from their use for television purposes, has led to other applications, notably in assisting the navigation of aircraft by the use of "gliding" beams for making "blind" landings in foggy weather. In inventions relating to transport, motor control systems for electric vehicles tend to complete automaticity in the passage from one stage of control to another. In electrically-driven vehicles, attention is being directed to the replacement of resistances by more economical current graduating devices in the motor control system. Electrically-operated safety razors with vibrating blades represent a fresh field of invention. A spectacular development is the combination of a cooking-stove with a refrigerator, the waste heat of the stove being utilised to generate refrigerant vapour from solution.

Reference is made in the report to the London Conference of the International Union for the Protection of Industrial Property held last May. At this it was agreed to secure the abolition of the reservation of the rights of third parties, to place further restrictions upon the revocation of patents, to recognise the principle of independence of the protection of trade marks registered in another country after proper registration in the country of origin, and to make provisions for facilitating the assignment of a trade mark used in a business carried on in more than one country. It was accepted that an inventor shall be entitled to have his name mentioned in a patent, and other matters also received approval.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Abbots Langley (HERTFORDSHIRE).—Houses (234), Abbot Garden Estate; Charles Brightman & Son, Ltd., builders, Watford.

Bath.—Houses (128) (£43,950); W. John, builder, Llantrisant, near Cardiff. Cinema, Peter Street; N. D. FitzGerald.

Beckenham.—School, Coney Hall Estate, for Borough E.C.; S. Burgoine, architect, Shortlands, Bromley.

Beeston.—Modernisation of Palace Cinema; Cinema Co.

Berkshire.—Schools, Botley and Didcot, for County E.C.

Bicester.—Sewage disposal works; U.D.C. surveyor.

Bingley.—Houses (84), Gilstead; Ernest Turner, Ltd., builders, Bradford Street, Keighley.

Bishopbriggs (LANARKSHIRE).—Houses (98), Springfield; Jn. Stewart, 20, Albert Street, Motherwell.

Blackpool.—Houses (42), Carson Road; A. Howard. Houses, Devonshire Road, Lindale Avenue and elsewhere; R. Fielding & Son. Extensions to Caledonian Hotel, Promenade; E. Machin.

Bradford.—Bus station; Corporation Special Committee.

Bristol.—Houses (66), Horfield Estate; John Knox (Bristol), Ltd.

Brixworth.—Houses (49), Gorse Close, &c.; A. Hamson & Son, Ltd.

Bucknall (STAFFORDSHIRE).—Houses (262), Townend; Cornes & Co., Stoke-on-Trent.

Burnopfield.—Houses (150); N. T. Barker, builder.

Bury (LANCASHIRE).—Technical college, Market Street (£60,000); borough surveyor.

Canterbury.—School (650 places), Wincheap, for City E.C.; director of education.

Cheltenham.—Development of Ullenwood Estate, Coberley; Mr. Ackers.

Cheshire.—Senior school, Poynton, for County E.C.; F. A. Browne, county architect, The Castle, Chester.

Chesterfield.—Houses (78), Council estates (£18,500); W. Memmory & Sons, Ltd. Municipal offices (£103,002); Robert Carlyle & Co., Ltd., Manchester. Telephone exchange, Holymoorside, and taxation and county court offices, St. Mary's Gate, for H.M. Office of Works, King Charles Street, London, S.W. Extensions to Derby Road School for E.C.

Chippenham.—Church, Station Hill; R.C. Authorities.

Colchester.—Houses (32), Ipswich Road site; H. Collins, borough engineer.

Cranfield (BEDFORDSHIRE).—Aerodrome, with officers' and men's quarters (£40,000), for the War Department.

Cumberland.—Secondary school, Millom, for County E.C.; P. A. Baines & Son, Ltd., builders. School, Wigton, for County E.C.; J. Forster, county architect, 4, Alfred Street North, Carlisle.

Dagenham.—Public offices and fire station, Central Park (£110,965); E. Berry Webber, architect, 2, New Square, London, W.C.

Darwen (LANCASHIRE).—Houses (63), Hollins Grove Street; borough engineer, Municipal Offices.

Denbighshire.—Central schools, Abergele, for County E.C.; director of education, Wrexham.

Derby.—Houses, Roe Farm Estate; Harris Bros., builders, Marehay.

Dewsbury.—Houses (111), Leeds Road and Ravensthorpe Road, for J. Tierney.

Dudley.—Houses (77), Holly Hall Estate; Lloyd Bros. Houses (36), Tipton Road; W. Lindley.

Dumfries.—Houses (180), Lochfield; Jn. Blackley, Lochfield House.

Dundee.—Cinema for George Green, Ltd., Nethergate; John Fairweather, architect, 182, Trongate, Glasgow. Store, Wellgate, for the Great Universal Stores, Ltd. (£50,000); Isaac Wolfson, managing director.

Eastbourne.—Houses (70), Churchdale Road; borough engineer. Houses (26), Lottbridge Drive; Hammersley Estates, Ltd. Motor showrooms, Seaside; Hipwell's Cars, Ltd.

Edinburgh.—Sheriff's Court House, for Commissioners of H.M. Works and Public Buildings (£75,000); J. Wilson Paterson, architect of the Office of Works. Reconstruction of Craigleith General Hospital (£26,000); city architect.

Epsom.—Houses and flats; Williams, Pettett & Gardner, architects, 5, Ashley Road.

Fareham.—Houses (64); U.D.C. surveyor.

Findon (SUSSEX).—Shops, Cissbury Down Estate; A. T. W. Goldsmith, architect, Worthing.

Forfar.—Secondary school for E.C.

Glasgow.—School for Corporation Education Department, Govan; Walker, Hardie & Smith, architects, 108, Douglas Street, Glasgow.

Guildford.—Public hall, Stoke Park (£39,375); borough surveyor. Houses (32), Bannisters Farm Estate, for H. Ashenden.

Halesowen.—Houses (24), Hurst Green; G. Spurr, U.D.C. surveyor.

Haslingden.—Houses (44) and flats; T. Brown, Ltd., builders.

Hastings.—Houses (26), Oakfield Road; T. E. Relfe. Alterations to Central Hotel, Queen's Road; Oxley & Burleigh, architects. Extensions to printing works, Cambridge Road; F. J. Parsons, Ltd.

Ilkeston.—Extensions to Maternity Home; borough engineer. Improvements to Bennerley School for E.C.

Ipswich.—Extensions to Mental Institution; borough engineer.

Irish Free State.—(CASTLEBAR, Co. MAYO).—Electrical installation to Mental Hospital for the Committee of Management; P. J. Munden, architect, 1, South Frederick Street, Dublin. (SLIGO).—County Hospital doctor's residence for the Sligo Board of Health, Sligo; Cormac T. McLynn, architect, and Nicholas O'Dwyer, consulting engineer, Lower Abbey Street, Dublin.

Iver (BUCKINGHAMSHIRE).—Houses (424), Heatherden Hall Estate, for Henry Boot & Sons, Ltd., London.

Kent.—School, High Road, Mottingham; county architect, Maidstone.

Kidderminster.—Houses (62), Foley Park Estate; B. Denning, builder, Walsall.

Kingshill (LANARKSHIRE).—Houses (52); Jn. Stewart, 20, Albert Street, Motherwell.

Kingston (CANTERBURY).—Houses (100), Hoods Place, for W. Cordwell.

Lichfield.—Houses (42), near Stafford Road, for E. A. Coleman.

Lincoln.—Houses (108), Simon's Hill Estate, by direct labour; S. C. Baggott, city surveyor.

London.—(DEPTFORD).—Tenements, Speedwell (£21,792); Rowley Bros., Ltd. (ISLINGTON).—Re-development of Loraine Place (£100,000); L.C.C. architect.

Luton.—Mineral water factory; Thomas & Evans, Ltd., Porth.

Manchester.—Houses (32), Wood Road and Bedales Road, Baguley; Woodside Estate Co., 40, South King Street, Manchester. Art Gallery, old infirmary site, Piccadilly (£330,000); Art Gallery Committee.

Mirfield.—Houses (22), Sunnybank Road, for Paramount Yorkshire Homes, Ltd.

Newark.—Cinema, Middle Gate; Savoy Cinema Co.

Newcastle (STAFFORDSHIRE).—Houses (70), Chesterton; T. Hughes, builder, 22, Bagnall Street, Newcastle-under-Lyme. Houses (40), Friars Wood Estate and Priory Road; S. W. Carryer, builder, Friarswood, Newcastle-under-Lyme. Houses (300), near Porthill Road; The 1933 Housing Society, Ltd., Essex House, Essex Street, Strand, London, W.C.2. Houses (70), Talk Road and Wolstanton Road; Madew & Wardle, builders, Maybank.

Newcastle-on-Tyne.—Colleges of Commerce and Technology for C.C. (£225,000); Marshall & Tweedy, architects, 129, Pilgrim Street.

Newport (I.O.W.).—Factory, Westminster Lane; Phelps & Steadman, architects.

Northampton.—Houses (43), Scarletwell Street; Bainbridge, Ltd., Doncaster.

Northumberland.—Extensions, Council School, Stobswood, for County E.C.

Nottinghamshire.—Extensions to Mental Colony; county architect.

Oxford.—Houses (112), Wolvercote Estate; city engineer. Public baths, Cowley and Headington; Baths Committee.

Plymouth.—Houses (26), Mainstone Avenue, Prince Rock; Miss L. Cohen. Houses (26), Norfolk Road, Laira; J. Neal.

Portsmouth.—Houses (25), Hayling Avenue; Dye Bros. Houses, Pervin Road, Cosham; G. W. Fancey. Business premises, Commercial Road; British & Colonial Furniture Co.

Prudhoe-on-Tyne.—Houses (56), Castle Dene; W. Dixon & Sons, architects, 1, Collingwood Street, Newcastle-on-Tyne.

Romford.—Houses (40), and flats, Rush Green Estate; Thomas Bates & Sons, Ltd., builders.

Southampton.—Schools, Bassett Green and Shirley Warren, for Borough E.C.; F. L. Freeman, secretary.

Spennymoor.—Houses (66); U.D.C. Housing Committee.

Stockton-on-Tees.—Houses (304), Blue Hall Estate; G. P. Stainsby, architect, 25, High Street. Reconstruction of Globe Cinema; proprietors.

Sunderland.—Houses (44), Deepdene Road, and Druridge Avenue; W. Leech, builders, Coutts Road, Newcastle-on-Tyne. Houses (98), Dykelands Road; H. T. D. Hedley, architect, 49, Frederick Street. Houses, West side of Fulwell Road; borough engineer.

Surrey.—Mental hospital, Botleys Park (£430,000), for C.C.; J. M. Sheppard & Partners, architects. School, Keston Avenue, Purley; county architect.

Swansea.—Rebuilding 238, Oxford Street; Jays (Western), Ltd.

Tain.—Houses, electrical work; J. Hinton, Gall & Sons, architect, Inverness.

Tyldesley.—Houses (72), Princes Avenue, extension site; U.D.C. surveyor.

Walsall.—Houses (41), Woodwards Road; H. Lloyd. Three schools, Housing Estates (£49,000), for E.C. Extensions to sewage works, Bescot (£51,000); borough engineer.

Wantage.—Houses (62); Building & Public Works Construction Co., Ltd., Swindon.

Warrington.—Houses (38), Liverpool Road; J. F. Sims.

Warwickshire.—Technical college, Rugby (£97,500), extensions to Mental Colony, Weston (£70,000), and Exhall Ash Green School, Bedworth; county architect.

Widnes.—Houses (156); Leyland Construction Co., builders.

Wigan.—Houses (212), Beech Hill, by direct labour; borough surveyor. Houses (104), Carr Common Farm, Hindley Green; James Green, builder, Atherton Road, Hindley Green.

Worthing.—Houses (22), Brook Close; H. M. Potter. Houses (34), Brookdean Road; H. P. Brazier. Houses, Mulberry Lane; Jeffery Houses, Ltd. Restaurant, flats and garage, Chapel Road; Brittains (Worthing) Garage, Ltd.

York.—Houses (51), Leslie Avenue; S. Newman. Houses (220) and flats, Water Lane Estate (£79,989); Tarran Industries, Ltd. School (400 places), Osbaldwick Lane, for City E.C.; director of education. Enlargement to Girls' School, The Mount; Society of Friends. Extensions to transport depot, Barbican Road (£10,500); Transport Committee.